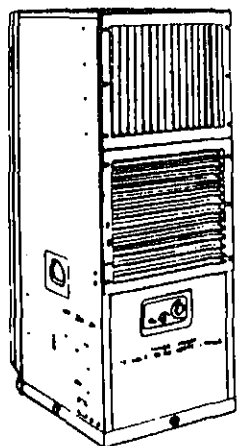


TECHNICAL MANUAL
OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT
AND GENERAL SUPPORT MAINTENANCE MANUAL

RETURN TO ORIGINATOR

R CONDITIONER, VERTICAL COMPACT
18,000 BTU/HR, COOLING
12,000 BTU/HR, HEATING
208 VOLT, 3 PHASE, 400 HERTZ
RVEY W. HOTTEL, MODEL CV-18-4-08)
4120-01-089-4054



CHAPTER 1

CHAPTER 2 OPERATING

CHAPTER 3 OPERATOR

CHAPTER 4 ORGANIZATIONAL

CHAPTER 5 DIRECT SUPPORT

CHAPTER 6 GENERAL SUPPORT

APPENDIX A

APPENDIX B COMPONENTS OF

APPENDIX C MAINTENANCE ALI

APPENDIX D ADDITIONAL AUTH

APPENDIX E EXPENDABLE

APPENDIX F MANUFACTU

APPENDIX G

ALPHA

HEADQUARTERS, DEPARTMENT OF THE ARMY
18 MAY 1982

The Metric System and Equivalents

Linear Measure

centimeter = 10 millimeters = .39 inch
 decimeter = 10 centimeters = 3.94 inches
 meter = 10 decimeters = 39.37 inches
 dekameter = 10 meters = 32.8 feet
 hectometer = 10 dekameters = 328.08 feet
 kilometer = 10 hectometers = 3,280.8 feet

Weights

centigram = 10 milligrams = .15 grain
 decigram = 10 centigrams = 1.54 grains
 gram = 10 decigram = .035 ounce
 dekagram = 10 grams = .35 ounce
 hectogram = 10 dekagrams = 3.52 ounces
 kilogram = 10 hectograms = 2.2 pounds
 quintal = 100 kilograms = 220.46 pounds
 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
 1 deciliter = 10 centiliters = 3.38 fl. ounces
 1 liter = 10 deciliters = 33.81 fl. ounces
 1 dekaliter = 10 liters = 2.64 gallons
 1 hectoliter = 10 dekaliters = 26.42 gallons
 1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters =
 1 sq. decimeter = 100 sq. centimeters =
 1 sq. meter (centare) = 100 sq. decimeters
 1 sq. dekameter (are) = 100 sq. meters =
 1 sq. hectometer (hectare) = 100 sq. deka
 1 sq. kilometer = 100 sq. hectometers =

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters =
 1 cu. decimeter = 1000 cu. centimeters =
 1 cu. meter = 1000 cu. decimeters = 35.3

Approximate Conversion Factors

To change	To	Multiply by	To change	To
inches	centimeters	2.540	ounce-inches	newton-meters
feet	meters	.305	centimeters	inches
yards	meters	.914	meters	feet
miles	kilometers	1.609	meters	yards
square inches	square centimeters	6.451	kilometers	miles
square feet	square meters	.093	square centimeters	square inches
square yards	square meters	.836	square meters	square feet
square miles	square kilometers	2.590	square kilometers	square miles
acres	square hectometers	.406	square hectometers	acres
cubic feet	cubic meters	.028	cubic meters	cubic feet
cubic yards	cubic meters	.765	cubic meters	cubic yards
fluid ounces	milliliters	29.573	milliliters	fluid ounces
pints	liters	.473	liters	pints
quarts	liters	.946	liters	quarts
gallons	liters	3.785	liters	gallons
ounces	grams	28.349	grams	ounces
pounds	kilograms	.454	kilograms	pounds
short tons	metric tons	.907	metric tons	short tons
pound-feet	newton-meters	1.356		
pound-inches	newton-meters	.11296		

Temperature (Exact)

AIR CONDITIONER, VERTICAL COMPACT
18,000 BTU/HR, COOLING
12,000 BTU/HR, HEATING
208 VOLT, 3 PHASE, 400 HERTZ
(HARVEY W. HOTTEL, MODEL CV-18-4-08)
4120-01-089-4054

TM 5-4120-344-14, 18 May 1982, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages

Insert pages

2-9/2-10

2. Retain this sheet in front of manual for reference purposes.

Order of the Secretary of the Army:

CARL E. VANDERGRIFT
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:

To be distributed in accordance with DA Form 12-25A, Operator's, Unit, Intermediate Direct Support, and Intermediate General Support Maintenance Manual for Air Conditioner, Vertical Compact, 18,000 BTU Cool/12,000 BTU Heat (CV-20-4-08)

- Do not use compressed air for cleaning purposes except where reduced to less than 30 psi and then only with effective chip guarding and personal protective equipment.
- Dry cleaning solvent P-D-680 or P-S-661, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F (38°C).
- Use great care to avoid contact with liquid refrigerant or refrigerant gas being discharged from a container under pressure. Sudden and irreversible tissue damage can result from freezing. Wear the proper protective gloves and a face protector in any situation where skin- or eye-contact is possible. Prevent contact of refrigerant gas with flame or metal surfaces. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), highly toxic and corrosive gas.
- Escaping refrigerant gas under pressure can cause permanent tissue damage from sudden freezing.
- Polyurethane foam insulation breaks down to form toxic gases when heated to brazing temperature.

AND GENERAL SUPPORT MAINTENANCE MANUAL
 AIR CONDITIONER
 18,000 BTU/HR COOLING
 12,000 BTU/HR HEATING
 (HARVEY E. HOTTEL, MODEL CV-18-4-08)
 (4120-01-089-4054)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

help improve this manual. If you find any mistakes or if you know of
 improvements to the procedures, please let us know. Mail your letter, DA Form
 Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 loc
 k of this manual direct to: Commander, US Army Troop Support and
 Readiness Command, ATTN: DRSTS-MPSD, 4300 Goodfellow Blvd., St. Lo
 A reply will be furnished directly to you.

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Section I. GENERAL INFORMATION

PE.

Manual covers Air Conditioner, Model CV-18-4-08 (figure 1-1) manufactured by Harvey W. Hottel, Inc. The air conditioner cools or heats air for electronic equipment, and the comfort of personnel.

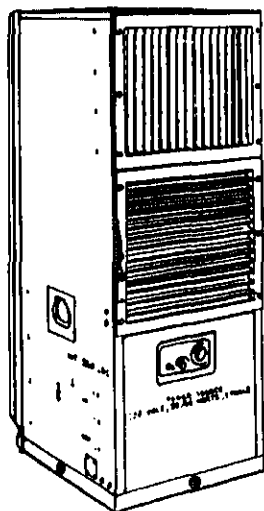


Figure 1-1. Air Conditioner

MAINTENANCE FORMS, RECORDS, AND REPORTS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System (TAMMS).

INSTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.

Procedures for destroying Army materiel to prevent enemy use are found in TM 750-244-3.

(Quality Deficiency Report). Mail it to us at: Command
Group Support and Aviation Materiel Readiness Command, AT
MEM, 4300 Goodfellow Boulevard, St. Louis, MO 63120. W
ou a reply.

HAND RECEIPT.

and receipts for Components of End Item (COEI), Basic Is
(BII), and Additional Authorization List (AAL) items are
in a Hand Receipt manual, TM 5-4120-344-14-HR. This ma
ned to aid in property accountability and is available th
der, US Army Adjutant General Publication Center, ATTN:
oodson Road, St. Louis, MO 63114.

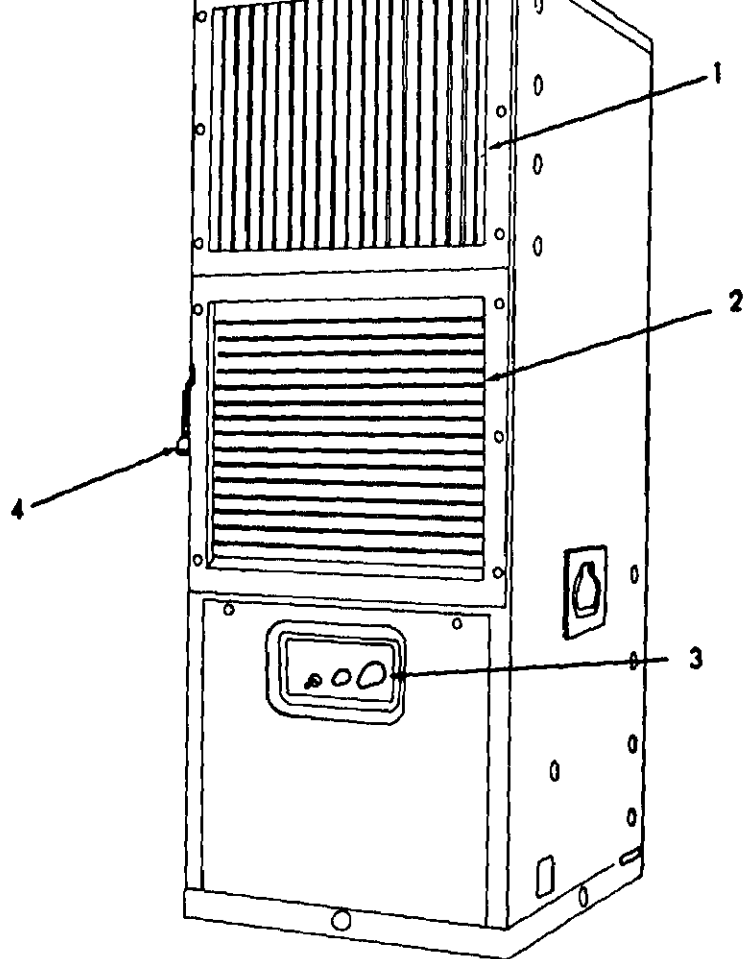
LIST OF ABBREVIATIONS.

.....
..... British Thermal Units
.....
..... Chemical, Biological, Radiologica
..... Cubic Feet Pe
..... Co
.....
..... Fa
..... Ho
.....
.....
..... Kilograms Per Square Ce
..... Kilograms Per Squa
.....
.....
..... Mi
..... Mega Neuton Pe
..... National Pip
..... Outside
..... Pounds Per Squ
.....
..... Revolutions Pe
..... Sensible He
.....
..... Volts Alternating
..... Volts Direct

- c. Electric motor driven.
- d. Runs continuously even under varying load conditions.
- e. Produces 18,000 BTU/HR of cooling.
- f. Produces 12,000 BTU/HR of heat.
- g. Contains all operating controls and parts.
- h. Adaptable to remote control.
- i. Adaptable to chemical and biological filters.

LOCATION AND DISCRIPTION OF MAJOR COMPONENTS.

Major components for operational purposes are shown and figure 1-2.



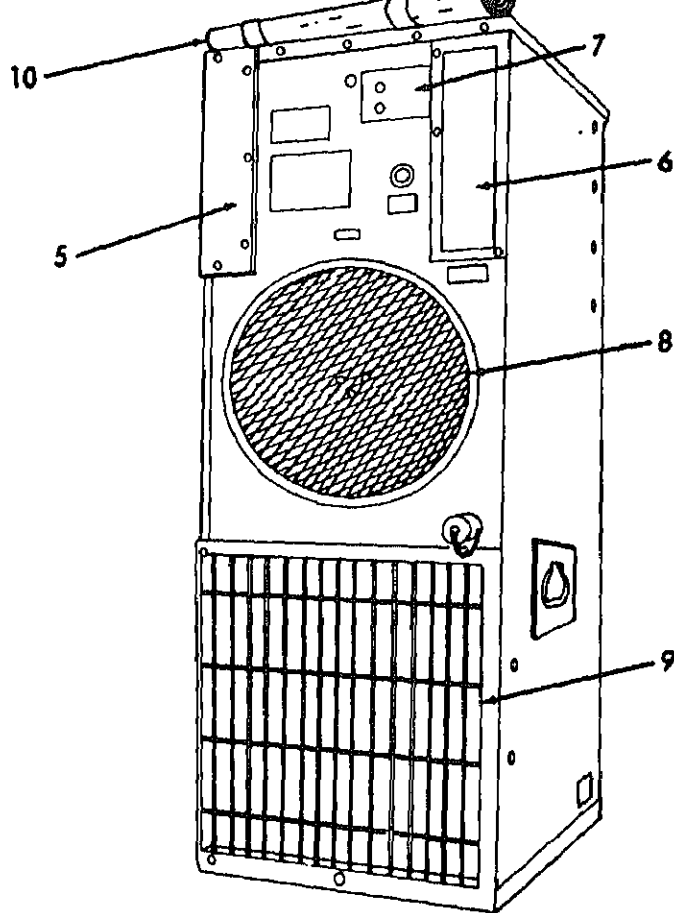
Front View

Charge Grille (1). Cooled or heated air is blown out of

Air Grille Damper (2). Input air from inside is pulled
in prior to being heated or cooled.

Panel (3). Used to select cooling or heating, temperature,
and fan speed.

Air Damper Door Control Chain (4). This chain when pulled
closes the air intake from inside to outside prior to heating.



Rear View

Biological Access Cover (5). Filter is installed to t
needed.

Screen (6). Input for fresh outside air.

). High and low pressure cutout switches.

Draws air through condenser coils.

Oil Guard (9). Protection for condenser (located behi

(10). External protection from weather conditions
in use.

1. EQUIPMENT DATA.

GENERAL

Description	Air Conditioner, Vertical
Manufacturer	Harvey W. Hottel, Inc.
Model	CV-18-4-08
National Stock Number	4120-01-089-4054

Dimensions and WEIGHT

Length	20 in (508 mm)
Width	17 in (431.8 mm)
Height	46 in (1168.4 mm)
Weight	247 lbs (112.14 kg)

SPECIFICATIONS

Capacity (Cooling)	18,000 BTU/HR
Capacity (Heating)	12,000 BTU/HR
Volts	208
Hertz	400
Phase	3

Section III. TECHNICAL PRINCIPALS OF OPERATION

12. GENERAL.

The air conditioner is a self-contained, air cooled, electric motor driven unit. The unit produces 18,000 BTU/HR for cooling, 12,000 BTU/HR for heating.

13. COOLING.

Cooling is obtained when the selector switch is turned to the cooling position and the temperature control is set below room temperature. This starts the unit. A fan motor and compressor will be running. When cool air is felt move the temperature control to a lower setting.

14. VENTILATE.

Ventilation is obtained when the selector switch is turned to the ventilate position. This starts the unit. A fan motor will be running. Moving the air intake damper control increases the amount of air entering the room.

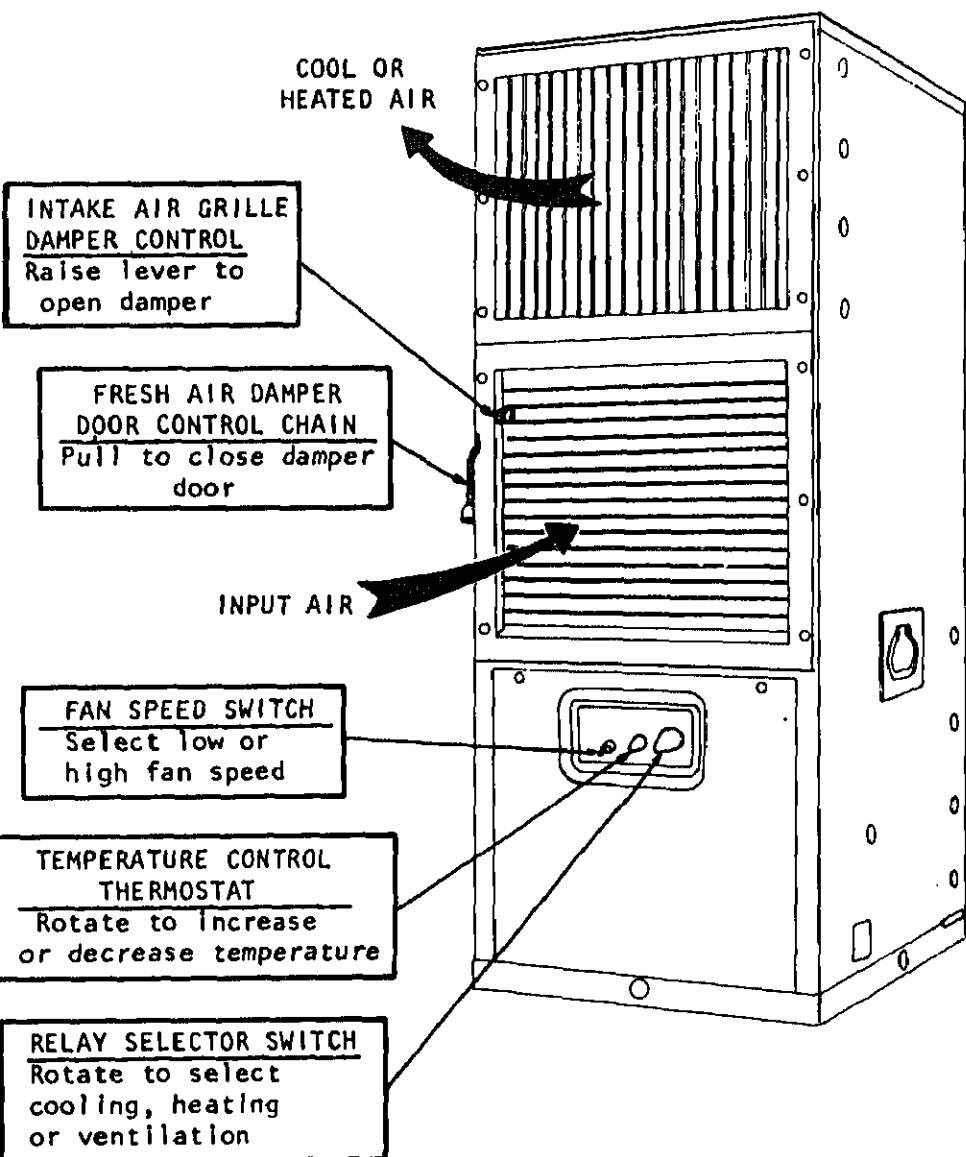
re control. The heat obtained is 6,000 BTU/HR.

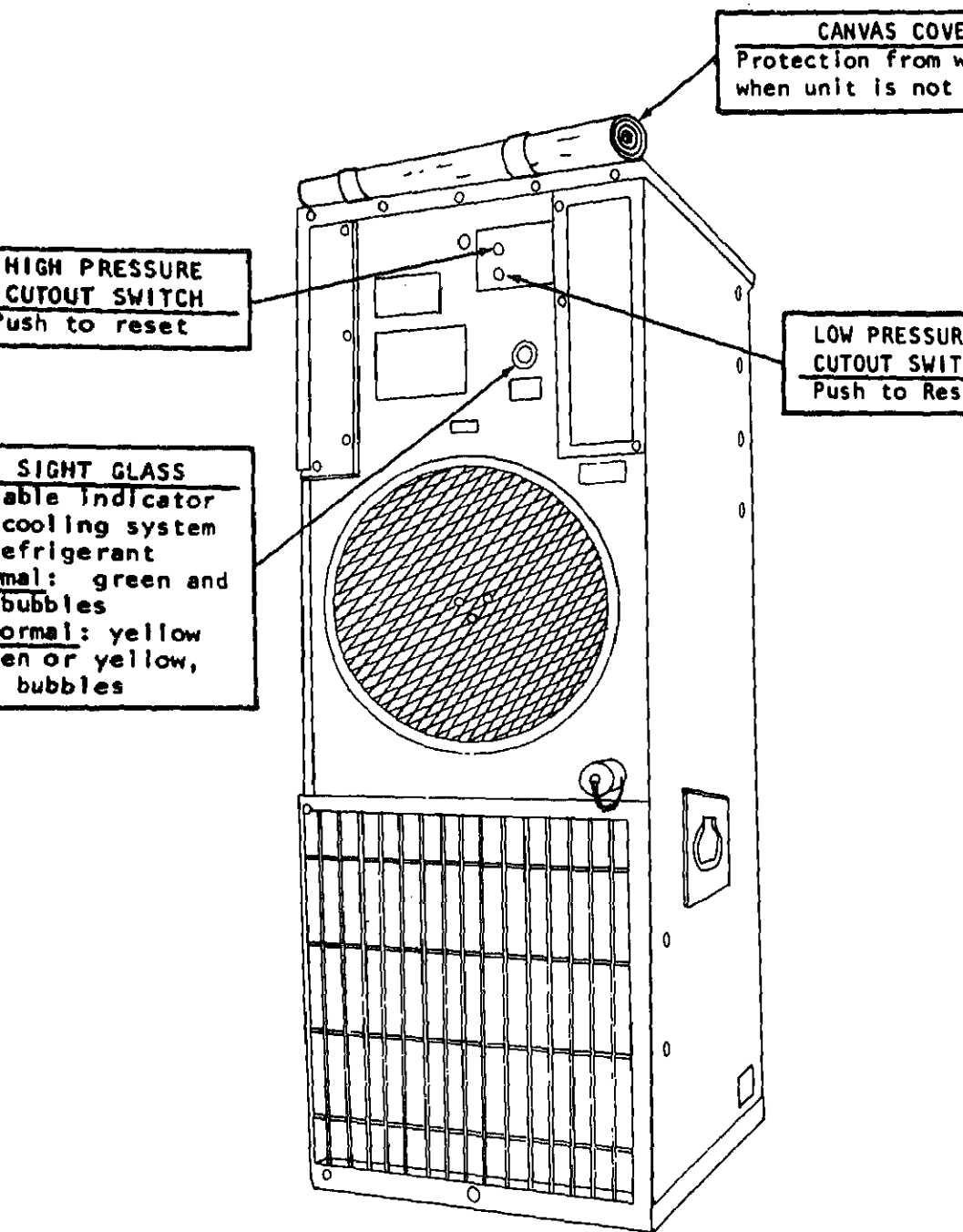
GH HEAT.

heat is obtained when the selector switch is turned
the temperature control is set above room temperature
e unit. A fan motor will be running and heat will be
is for cold days. If heat is not felt move the tempe
The heat obtained is 12,000 BTU/HR.

I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

Figure 2-1 shows the location of the operator's controls. Before operating the air conditioner make sure you know the location of all controls.





REAR VIEW

These checks and services help you find and fix the air conditioner if it is damaged or fails.

Item numbers in the first column of Table 2-1 are the things which are to be done. Column two "Interval" tells you how often to do them and who should do them.

If minor defects are found when the air conditioner is running, note them on what they are. Fix them or have them fixed. If the air conditioner has stopped running, stop the air conditioner.

NOTE

While the air conditioner is running, if any defect develops that you think will damage the air conditioner, stop it at once.

Record all defects and steps taken to fix them on DA Form 264 (Equipment Inspection and Maintenance Work Sheet) as soon as possible.

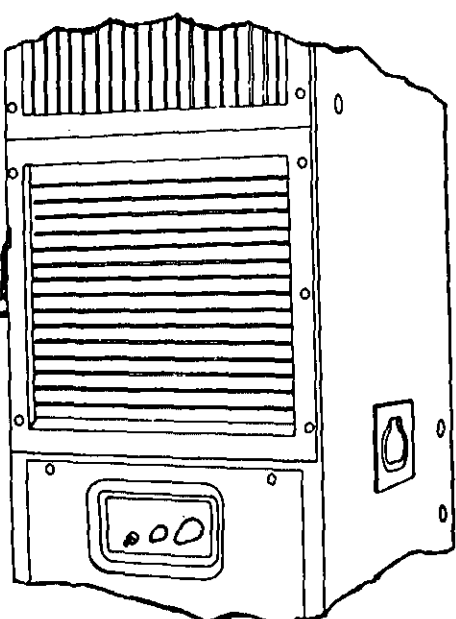
Before you operate: Always keep in mind the WARNINGS and CAUTIONS located on the inside front cover. Perform your before (B) PMCS.

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

B - Before operation
D - During

A - After operation
W - Weekly

Item Number	Interval Operator Daily				ITEM TO BE INSPECTED PROCEDURE Check for and have repaired or adjusted as necessary.	Equipment Ready/Av. If:
	B	D	A	W		
1	•				<p>CANVAS COVER Inspect for tears, mildew, or rot. Inspect turn-lock eyelets and fasteners for damage. If damage cannot be repaired install a new canvas cover. (See para 4-8.)</p> <p>FRONT</p>  <p>FRESH AIR DAMPER</p>	
2	•				<p>FRESH AIR DAMPER Pull chain to close damper door</p>	

in normal weather conditions is described.

2-4. STARTING THE EQUIPMENT

Before you operate. Always keep in mind the CAUTIONS and WARNINGS.

CAUTION

Before turning on any of the air conditioning controls, make sure that the fabric is rolled up and secured, and that evaporator and discharge grilles are fully open.

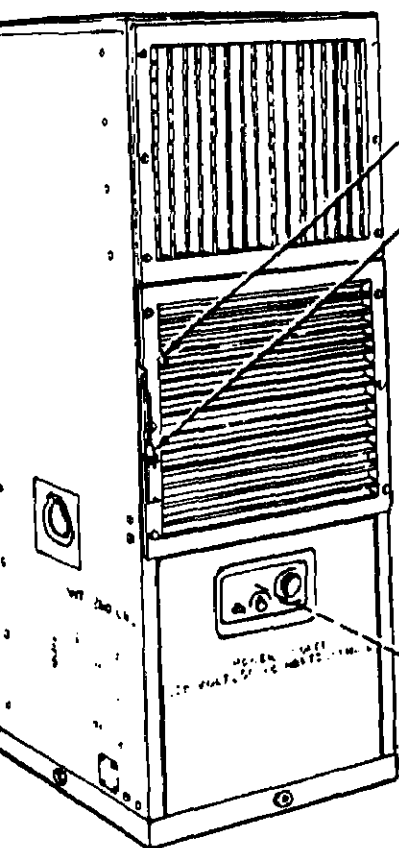
To start the air conditioner refer to figure 2-2 type of operation in table 2-2. Then make the settings.

CAUTION

Do not perform the following operations until at least four hours after power has been connected to the air conditioner if it has been stored at freezing temperatures within the past 24 hours. If knocking or pounding noises are heard when the compressor is started, shut down at once. Leave the unit connected to the unit, and wait an additional four hours before attempting another start.

2-5. STOPPING THE EQUIPMENT.

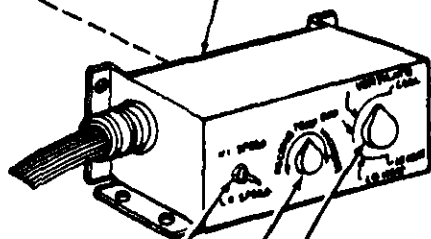
Place the rotary selector switch as shown in figure 2-5 in the OFF position.



INTAKE AIR GRILLE DAMPER CONTROL

FRESH AIR DAMPER DOOR (CONTROL CHAIN)

CONTROL PANEL



ROTARY SELECTOR

TEMPERATURE CONTROL
THERMOSTAT

TWO-SPEED FAN SWITCH

Conditioning Mode	Control Thermostat Setting	Grille Dampers	Dampers
Heating - 100% recirculation	Desired temperature	Open	Closed
Heating - with fresh air	Desired temperature	Partially closed*	Open
Heating - with fresh air drawn through CBR filter (or air con- ditioned)	Desired temperature	Open	Closed
Cooling - 100% recirculation	Desired temperature	Open	Closed
Cooling - with fresh air	Desired temperature	Partially closed*	Open
Cooling - with fresh air drawn through CBR filter (or air con- ditioned)	Desired temperature	Open	Closed
Ventilation - maximum outside air	Any	Closed	Open

* Partial closing of the intake air grille dampers causes a greater percentage of total air flow to be drawn from the outside.

To achieve maximum, cooling, heating, or ventilation, the two-speed fan should be set on Hi Speed.

...following conditions: extreme cold, extreme heat, extreme humidity, rainy or humid conditions, salt water areas, and muds.

OPERATION IN EXTREME COLD.

The air conditioner is designed to operate in temperatures down to 0°F (-45°C). At extremely low temperatures, extra care must be taken to reduce heat loss of the enclosure, by weather-stripping doors and windows, insulating surfaces exposed to the outside, and reducing the amount of outside air drawn in through the fresh air damper of the air conditioner. Do not disturb wiring during extremely cold weather. Wire and insulation become brittle, and are easily damaged.

OPERATION IN EXTREME HEAT.

The air conditioner is designed to operate in temperatures up to 120°F (49°C). At extremely high temperatures, extra care must be taken to reduce the cooling load of the enclosure by checking doors and windows to be sure that they are tight, using window shades to shut out direct rays of the sun, reducing the use of electric lights and other heat producing equipment, and limiting the introduction of outside air through the damper of the unit.

OPERATION IN DUSTY OR SANDY AREAS.

Sand and dust can seriously reduce the efficiency of the air conditioner by obstructing the air filter and reducing airflow. Clean the air filter daily, if necessary to provide unobstructed airflow. Check the volume of air drawn in through the fresh air damper. Repairs and adjustments should be made to increase the frequency of cleaning the air filter, the air eliminator and checking drainage from the drip pan and thermostat. Keep the canvas cover zipped closed when the air conditioner is not in use.

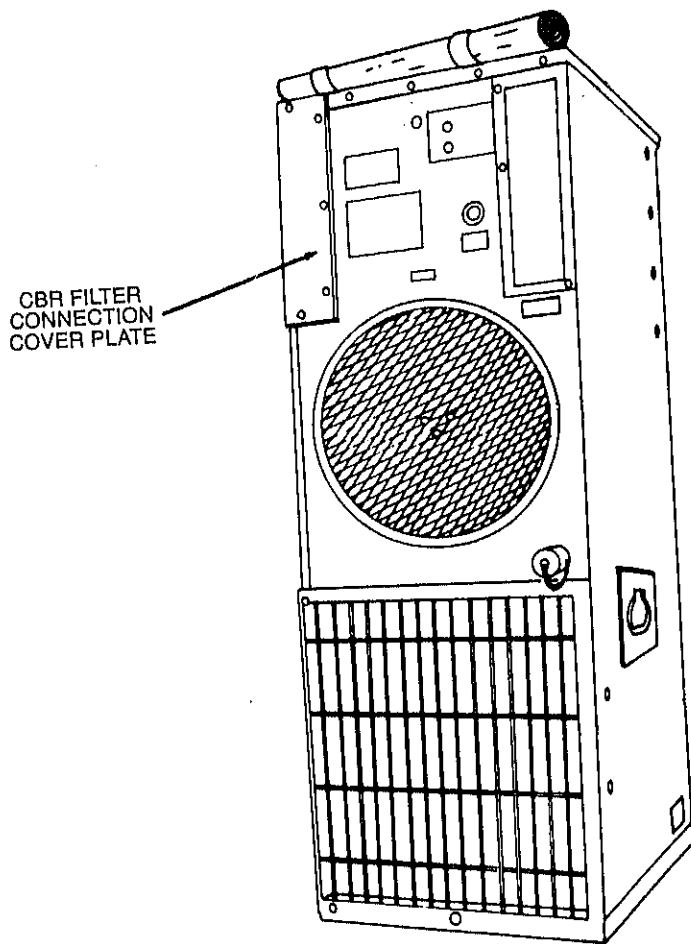
OPERATION UNDER RAINY OR HUMID CONDITIONS.

The air conditioner is designed to be exposed to the elements and is reasonably weatherproof. However, during periods of extreme weather, windy weather, the canvas cover should be closed when the air conditioner is not in use. The canvas cover should be opened during clear weather conditions, to permit the interior to dry out.

OPERATION IN SALT WATER AREAS.

To prevent the accumulation of salt on exposed surfaces, the canvas cover should be kept closed when the air conditioner is not in use. Exposed areas should be spray-rinsed or sponged with fresh water periodically to remove salt encrustations.

chemical, biological, or nuclear source. Should it be necessary to operate in conditions requiring use of CBR filter, for your shelter or facility installation.



CBR Filter Connection Location

The following are general suggestions and do not apply if they conflict with instructions for your shelter or facility installation.

- 1) The fresh air damper (door) should be closed, the opening should be covered with a suitable material to ensure the shelter is airtight.
- 2) Fresh air damper (door) chain may be taped over to prevent damper from being opened.
- 3) The conditioned air inlet louvers should be adjusted (partially or completely) closed in order to reduce the filter intake volume. This will cause a more positive pressure on inside of shelter or enclosure and air will be drawn in other than through the CBR filter.

GENERAL.

air conditioner does not require lubrication.

Section II. TROUBLESHOOTING

GENERAL.

Table lists the common malfunctions which you may find during operation or maintenance of the air conditioner or it's components. You should perform the tests/inspections and corrective actions listed.

This manual cannot list all malfunctions that may occur, the tests/inspections and corrective actions. If a malfunction is not corrected by listed corrective actions, notify the maintenance personnel or the manufacturer.

Table 3-1. Operator Troubleshooting

CONDITION

TEST OR INSPECTION

CORRECTIVE ACTION

Air conditioner fails to operate (all circuits inoperative).
Refer to Organizational Maintenance.

ALFUNCTION

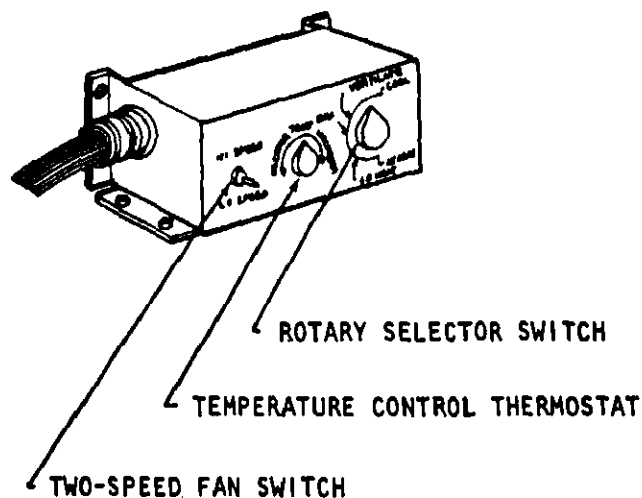
TEST OR INSPECTION

CORRECTIVE ACTION

2. Insufficient or no cooling.

Step 1. Temperature Control thermostat and/or rotary switch improperly set.

Reset controls (para 2-4).



Step 2. Two-speed fan switch improperly set.

Move to Hi-Speed setting (para 2-4).

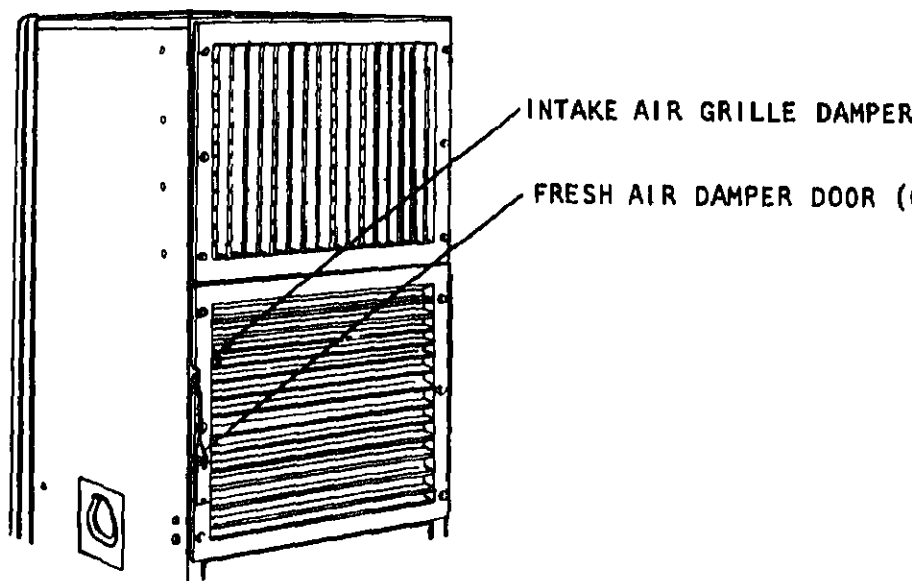
FUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 3. Improperly adjusted or closed intake air grille and fresh air damper door control intake.

Adjust intake air grille and fresh air damper



Step 4. Low refrigerant charge indicated by bubble glass.

Check for abnormal condition of refrigerant in after air conditioner has been in cooling operation at least twenty minutes. If low charge is observed, condition to Direct Support Maintenance.

CTION

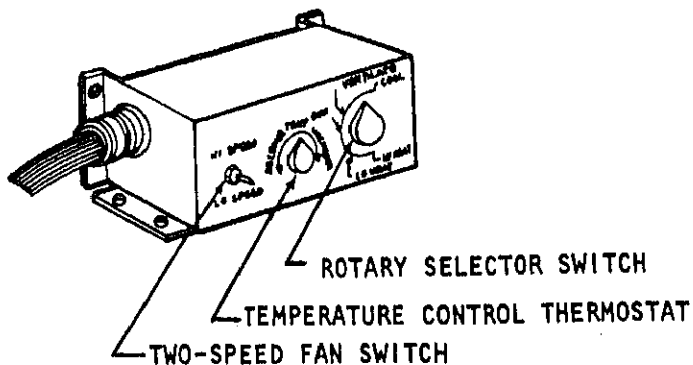
TEST OR INSPECTION

CORRECTIVE ACTION

Insufficient or no heating capacity.

Step 1. Temperature control thermostat and/or rotary selector switch improperly set.

Reset controls (para 2-4).

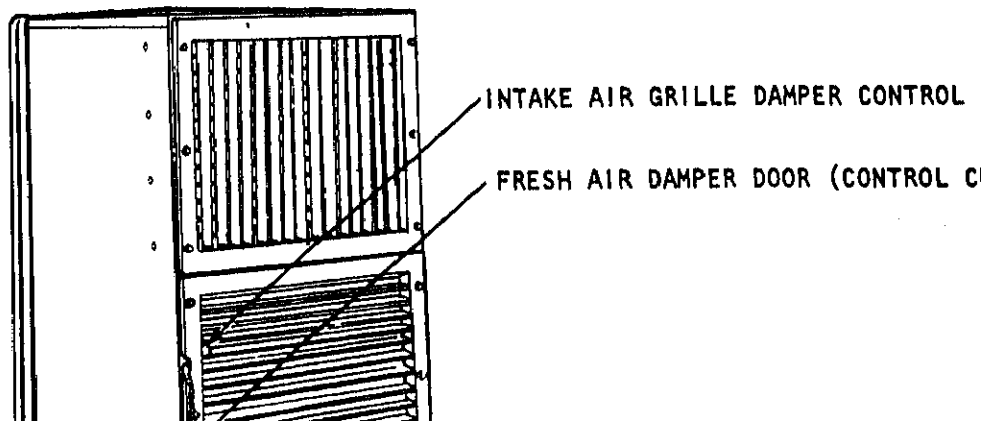


Step 2. Two-speed fan switch improperly set.

Move to Hi-Speed setting(para 2-4).

Step 3. Air movement over evaporator insufficient.

Adjust intake air grille and fresh air damper door (para 2-4).



CORRECTIVE ACTION

4. Other causes.

Refer other causes to organizational and direct support maintenance personnel.

ERAL.

ir parts are listed and illustrated in TM 5-4120-344-
ools are required for maintenance of the equipment.
nt, and diagnostic equipment (TMDE) and support equip
equipment found in any refrigeration shop.

Section II. SERVICE UPON RECEIPT OF EQUIPMENT

PACKING.

air conditioner is bolted to the wood shipping pallet
removed when the unit is to be installed in a permanen
roceed as follows:

t the steel strapping, and carefully remove the woode
lastic wrapping from the unit.

th the help of at least one assistant, lay the air co
her side, supported by cushioned support blocks.

move four bolts securing the shipping pallet to the a
s base plate.

turn the unit to the upright position.

CKING UNPACKED EQUIPMENT.

k the air conditioner in accordance with the followin
ons:

spect the equipment for damage incurred during shipme
ment has been damaged, report the damage on DD Form 6
rovement Report.

eck the equipment against the packing slip to see if
is complete. Report all discrepancies in accordance
on of TM 38-750.

ould be installed (figure 4-1) on a level supporting
uniform condensate drainage. If a level surface is
unit may be mounted on an angle not greater than
horizontal. If this type of mounting is unavoidable
the condensate drain to the drain opening in the
base plate. Drain plugs are located in the middle
base plate. Standard 1/2 inch by 14 NPT fittings
place of one or more of these plugs to conduct
an acceptable drainage area. A standard garden
for this purpose.

ensions. An opening $18\frac{1}{2} \pm \frac{1}{2}$ inches ($47 \pm$
 $\frac{1}{2}$ inches (124.5 ± 1 cm) high is required
the air conditioner. A removable filler plate
above the unit to permit ready removal of the top
g.

The air conditioner should be bolted to the mount-
base plate contains four mounting holes for this
figure 4-2 for base mounting plan.

ditioner must have an unobstructed flow of air in
efficiently. This minimizes the cooling load on the
tem.

$18\frac{1}{2} \pm \frac{1}{2}$ IN
 $(47 \pm 1$ CM)

FILLER PLATE
(REMOVE FOR ACCESS
TO TOP OF UNIT)

FLEXIBLE
PLASTIC
FOAM

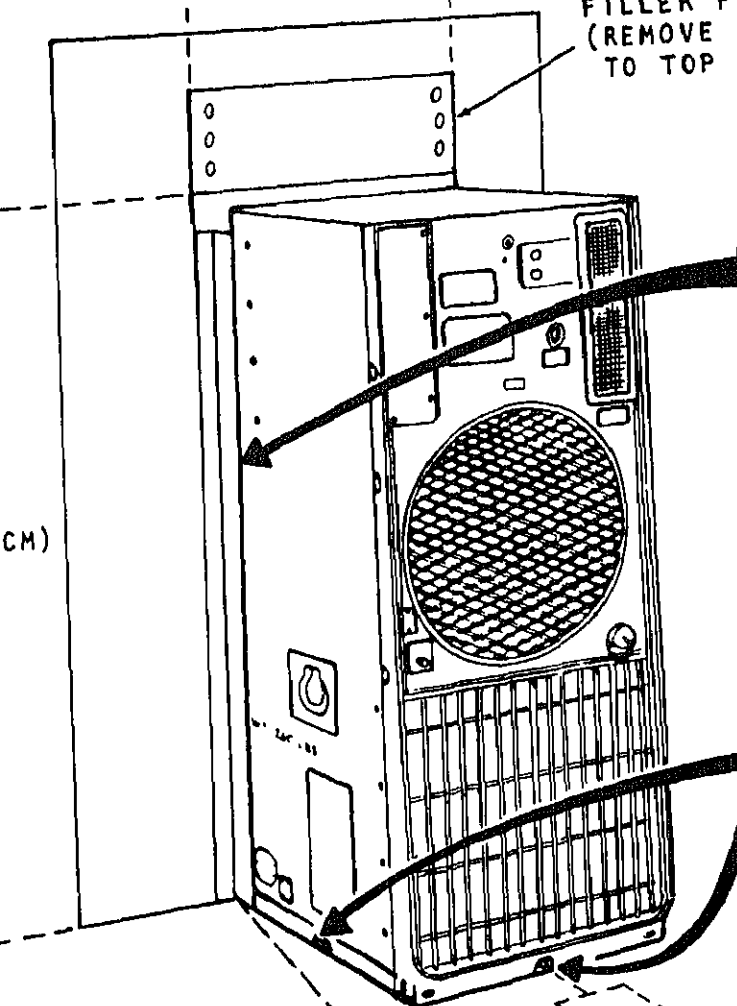
PRESSURE
SENSITIVE
TAPE

DRAIN
CONNECTIONS

DRAIN PLUG
 $\frac{1}{2}$ INCH BY 14 NP
OR
DRAIN HOSE
AND ADAPTER

NOT GREATER
THAN 5°

CM)



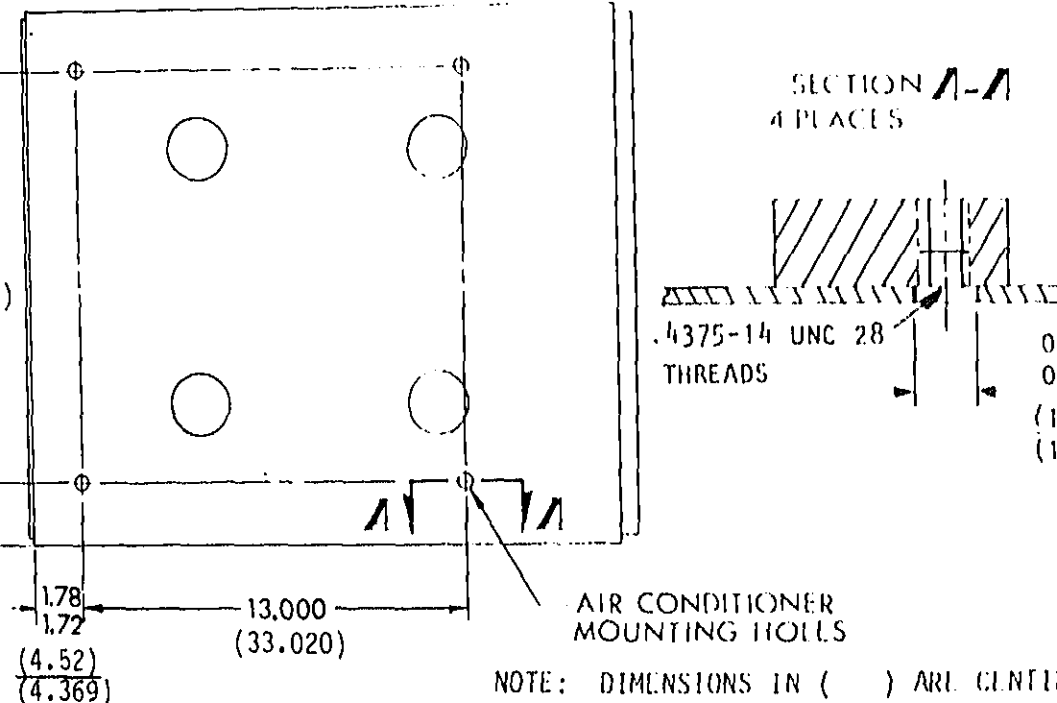


Figure 4-2. Base Plan

POWER SOURCE.

The air conditioner operates on 208 volts, 3-phase, 400 Hz. The power input receptacle (figure 4-3) is located at the top of the unit above the condenser coil inlet. Alternate locations for power connections are provided at both sides of the unit. These alternate locations may be used by interchanging the receptacle at the top of the unit and one of the cover plates at each side of the unit. The unused receptacle locations are covered to prevent air from being drawn through the opening. To move the power receptacle to an alternate location proceed as follows:

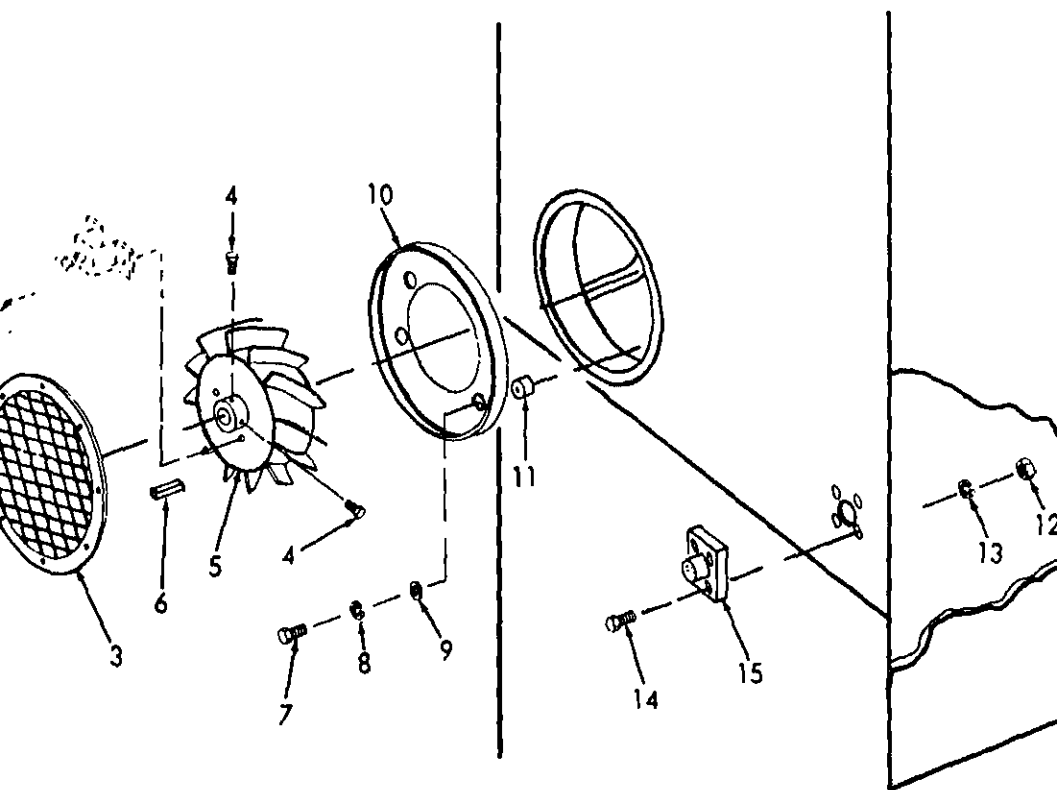
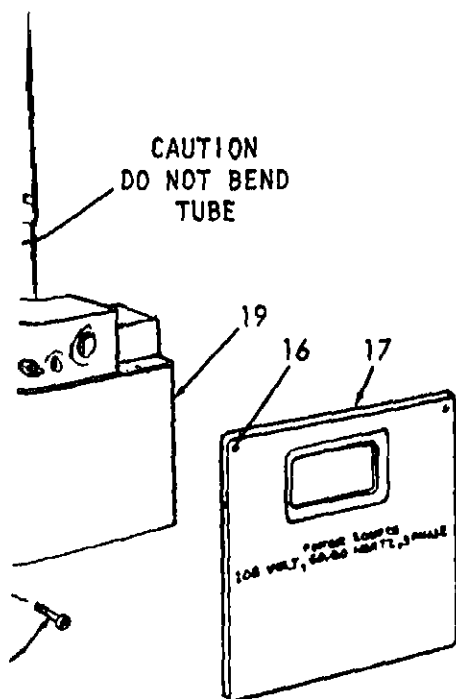


Figure 4-3. Power Receptacle Relocation (Sheet 1 of 2).

- 1) Remove screws (1) and lockwashers (2) securing condenser guard (3) to housing.
- 2) Remove condenser fan guard.
- 3) Remove set screws (4).
- 4) Using a wheel puller install two 1/4 inch bolts. Screw bolts evenly.
- 5) Remove condenser fan (5) and key (6).
- 6) Remove screws (7), lockwashers (8), washers (9), that baffle (10) and bushings (11).



location (Sheet 2 of 2).

16).

s (18) that attach junction
ion box as needed for access



ontrol panel.

the alternate power location
r left sides of the case.

2) and screw (22) remove

- (1) Install plate (21) using screws (22), nuts (24) (23), to the access hole where the connector (15) removed.
- (2) Install connector (15) using screws (13) washers nuts (12).
- (3) Replace junction box (19).

CAUTION

DO NOT BEND TUBE

- (4) Tighten turn-button fasteners(18).
- (5) Reinstall lower panel (17), tighten turn-button (16).
- (6) Install baffle (10) and bushings (11) using screws washers (9) and lockwashers (8).

CAUTION

Do not hammer the impeller onto the motor shaft. The motor bearings would be damaged. If difficulty is encountered, dress out rough spots on the shaft with a fine file, stone or abrasive cloth. Apply a coating of light oil to ease assembly.

Align keyways in shaft and impeller, install key. Press impeller (5) onto shaft. The end of the shaft should be even with the face of the hub when the impeller is completely in position. Tighten setscrews (4) to the shaft. Starting with the keyway setscrew, tighten to a torque of 78-82 pound-inches (8.87-9.33 newton-meters).

NOTE

In order to direct the condenser exhaust upward and away from the intake, the condenser fan guard is designed so that it can be installed in only one way. All screw holes must match to permit correct installation.

- (8) Install condenser fan guard (3) with screws (1)

(5) Remove screw (8) securing thermostat tube bulb (10). Route bulb and tube through grommet (11).

(6) Loosen four turn-button fasteners (12) that attach junction box (13) to air conditioner.

CAUTION

When performing the following procedures. Do not bend bulb or tube (9).

(7) Carefully remove the junction box (13) from the air conditioner.

(8) Remove four turn-button fasteners (14) that attach control panel (15) and gasket (16) to junction box (13).

(9) Disconnect electrical connector (17) and remove control panel (15).

(10) Carefully coil thermostat tube and bulb on control panel in figure 4-4 and install cable clamp (10) and screw (8).

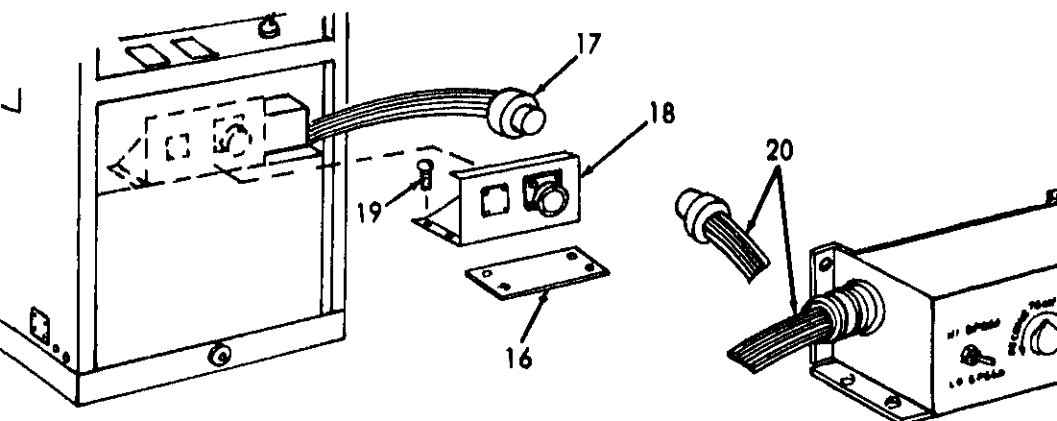
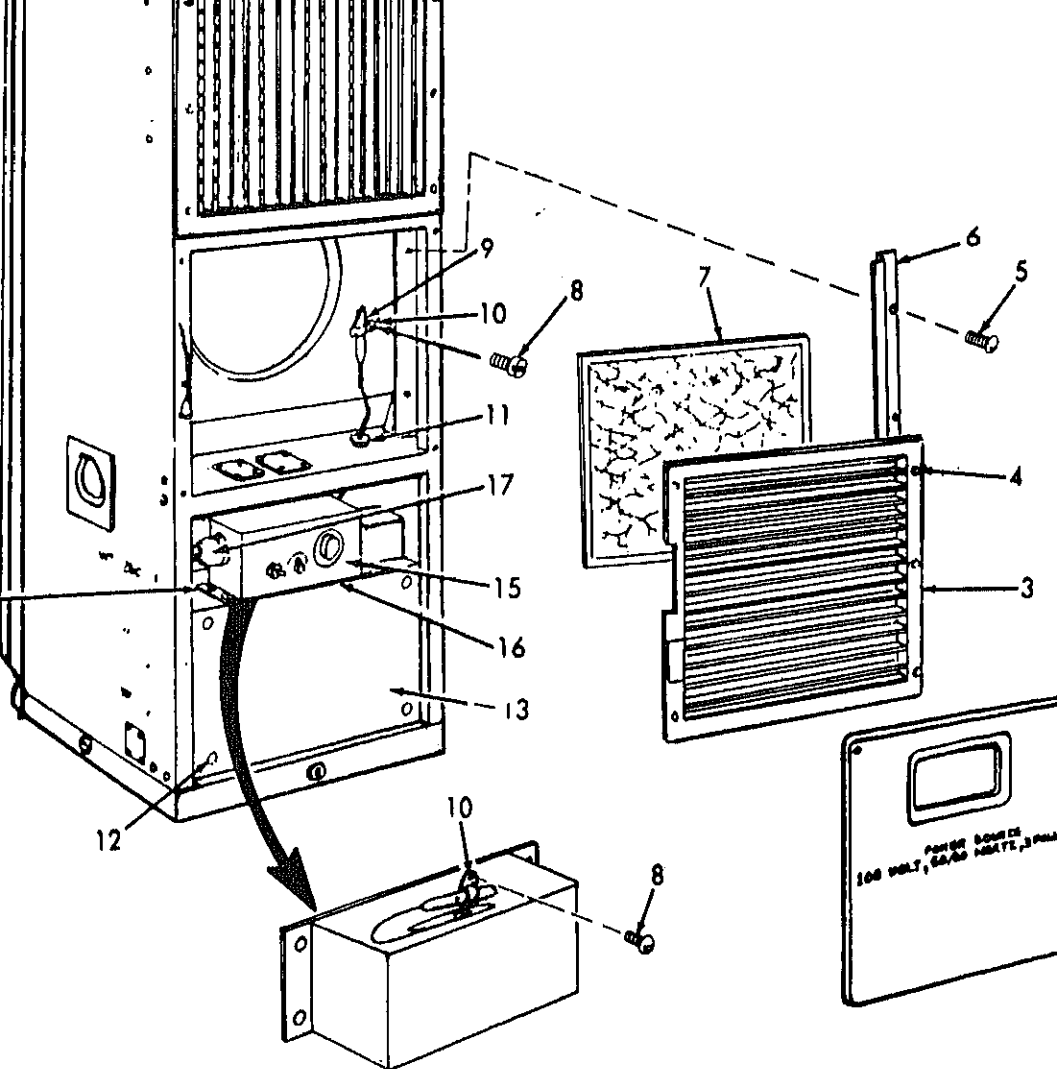
(11) Attach electrical connector (17) to block off assembly.

(12) Install block-off assembly (18), using gasket (16) and screws (19) to junction box (13).

NOTE

Replace gasket if damaged or defective.

(13) Reinstall junction box (13), and tighten turn-button fasteners (12).



Section III. PREVENTATIVE MAINTENANCE CHECKS AND SERVICES

GENERAL.

- a. Preventative Maintenance Checks and Services (PMCS) are to be done at the Organizational Maintenance level. The air conditioner is ready to use at all times. These services help you find and fix defects before the air conditioner is damaged or fails.
- b. Item numbers in the first column of Table 4-1 are the things to be done. Column two "Interval" tells you how often to do them and who should do them.
- c. If minor defects are found when the air conditioner is running, take notes on what they are. Fix them or have them fixed. Do not have stopped running the air conditioner.

NOTE

While the air conditioner is running, if any defect develops that you think will damage the air conditioner, stop it at once.

- d. Record all defects and steps taken to fix them on DA Form 264 (Equipment Inspection and Maintenance Work Sheet) as soon as possible.

Before you operate: Always keep in mind the **WARNINGS** located on the inside front cover.

the equipment must be kept in continuous operation, check service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

an item in a longer interval chart requires more frequent checking and servicing when the equipment is used in an unusual environment, the special intervals shall be indicated by an asterisk or similar indicator before the sequence number, or a letter after the sequence number. Footnotes explain special intervals.

Weekly

M - Monthly

Q - Quarterly

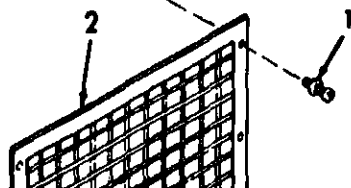
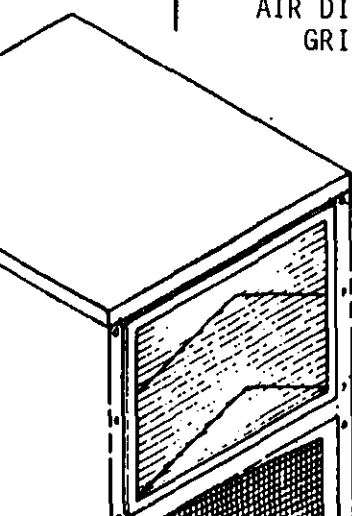
Interval		ITEM TO BE INSPECTED	PROCEDURE	Equipment in Not Ready/ Available I
M	Q			

WARNING

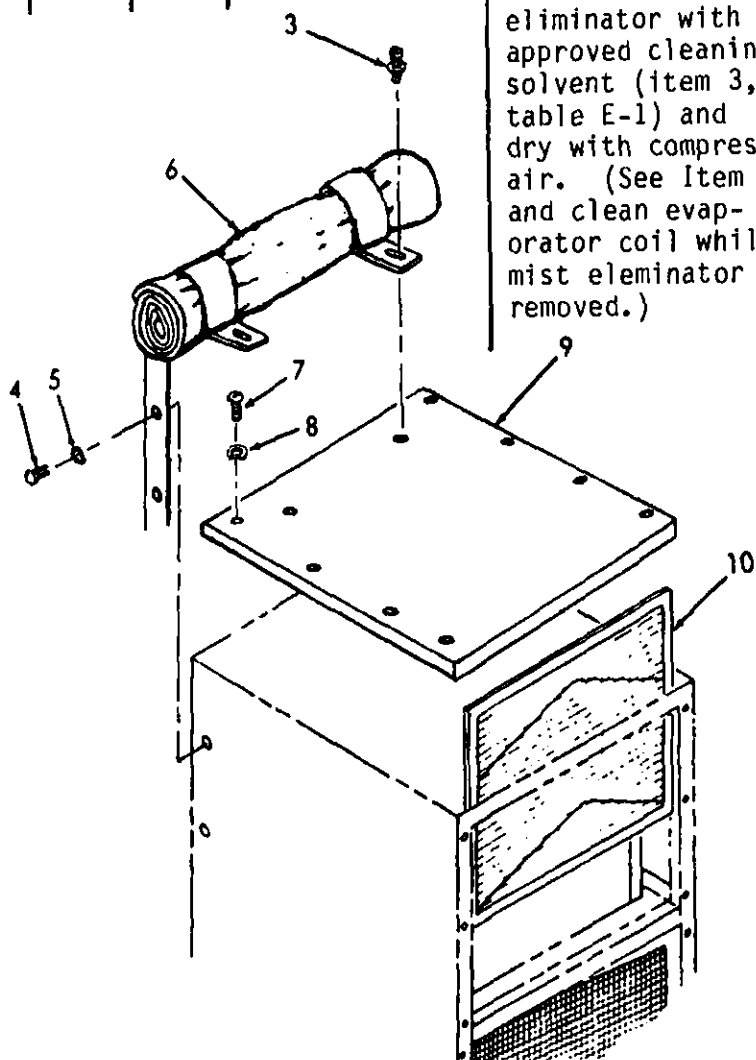
dry cleaning solvent (Fed. Spec P-D-680) (item 3, table E-1) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F (38°C).

AIR DISCHARGE
GRILLE

Loosen turn-lock fasteners (1) and remove grille (2). Remove excess amounts of dirt and clean with dry compressed air.



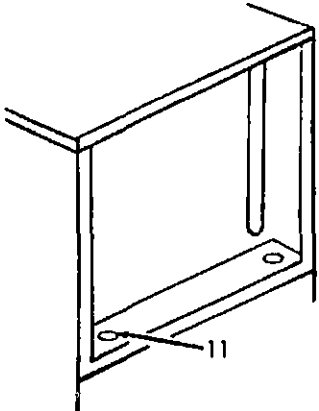
(3). Remove screws (4), washers (5), and remove canvas cover assembly (6). Remove screws (7), washers (8) and top cover (9). Lift mist eliminator (10) and remove. Clean mist eliminator with approved cleaning solvent (item 3, table E-1) and dry with compressed air. (See Item 13 and clean evaporator coil while mist eliminator is removed.)

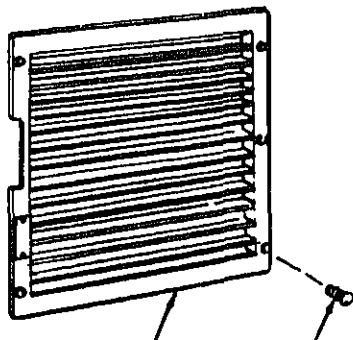
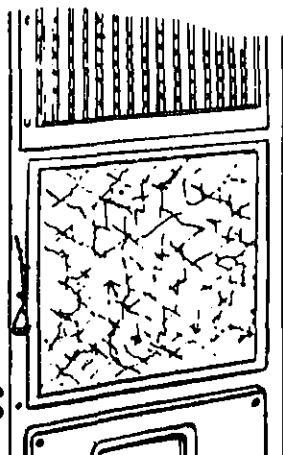


Weekly

M - Monthly

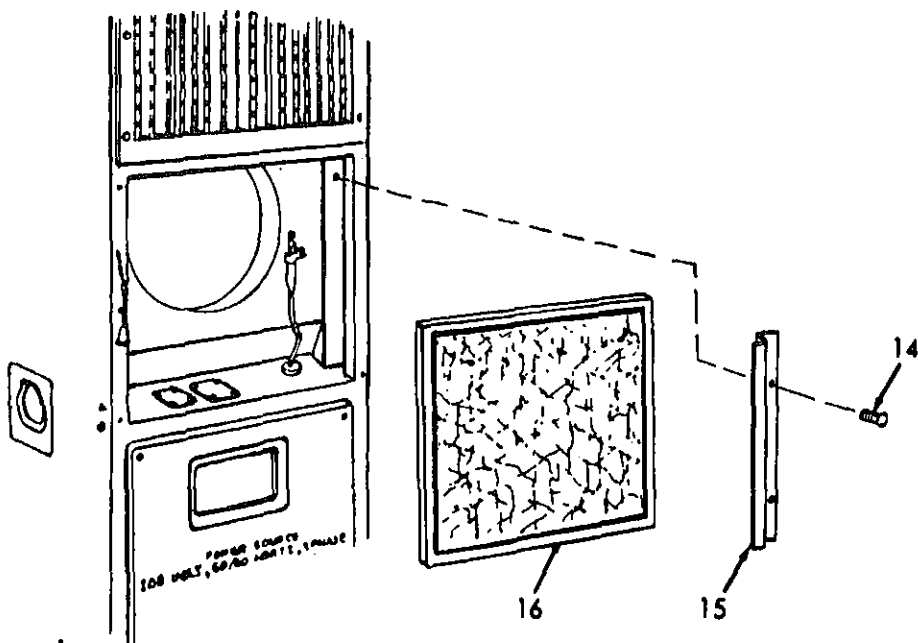
Q - Quarterly

Interval		ITEM TO BE INSPECTED	PROCEDURE	Equipment Not Ready Available
M	Q			
	•	DRIP PAN ASSEMBLY  AIR INTAKE GRILLE	<p>With the mist eliminator removed, clean the drip pan assembly (11). Inspect drain holes and remove accumulated dirt. Reinstall mist eliminator with drain holes at the bottom. Reinstall top cover, canvas cover and air discharge grille in reverse order of removal.</p> <p>Loosen turn-lock fasteners (12) and remove grille (13). Remove excess dirt and clean with dry compressed air.</p>	



AIR FILTER

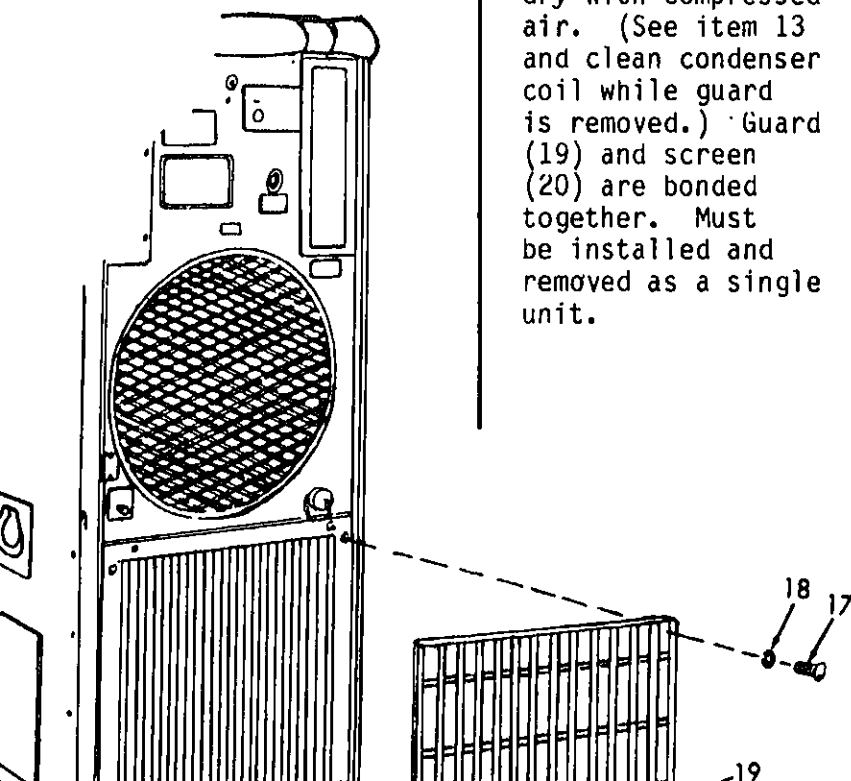
Remove screws (14), and filter retainer (15). Remove air filter (16). Clean with cleaning solvent (item 3, table E-1) and dry with compressed air. Dip or spray filter with filter - kote (item 5, table E-1) or oil, grade 20, 30, or better (item 9, table E-1). Reinstall air filter and air intake grille in reverse order of removal.



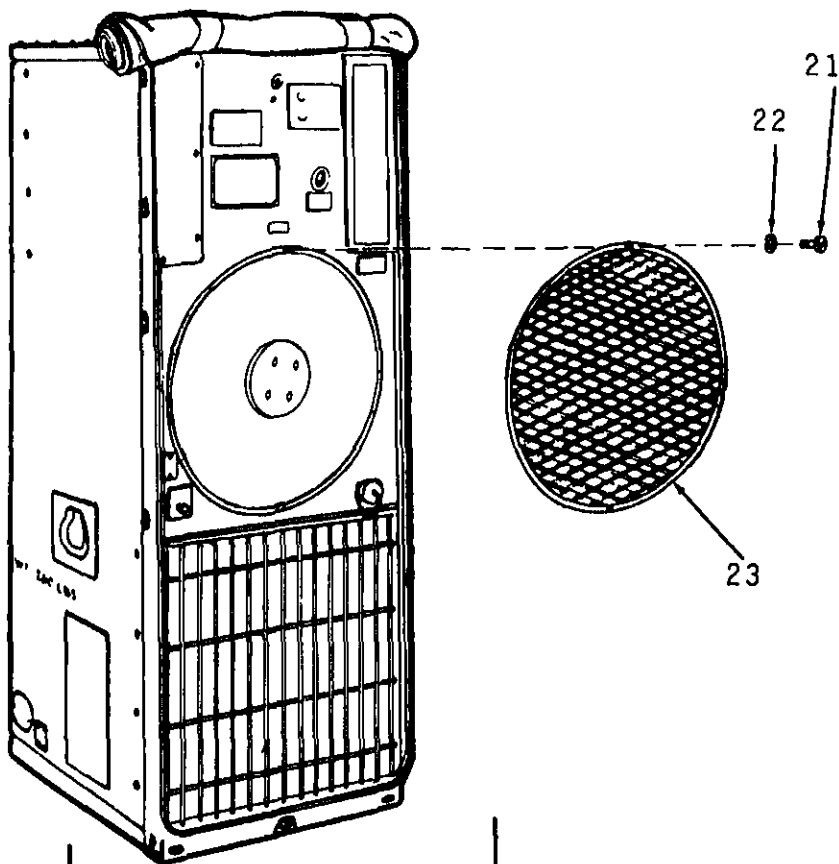
va)	ITEM TO BE INSPECTED	PROCEDURE	Equipment I Not Ready/ Available I
Q			

REAR
CONDENSER COIL
GUARD

Remove screws (17), washers (18), and remove guard (19). Screen (20) is now accessible. Clean guard to remove excess dirt with a brush. Clean screen with cleaning solvent (item 3, table E-1) and dry with compressed air. (See item 13 and clean condenser coil while guard is removed.) Guard (19) and screen (20) are bonded together. Must be installed and removed as a single unit.



solvent (item 8,
table E-1) and dry
with compressed
air. Reinstall
after cleaning.

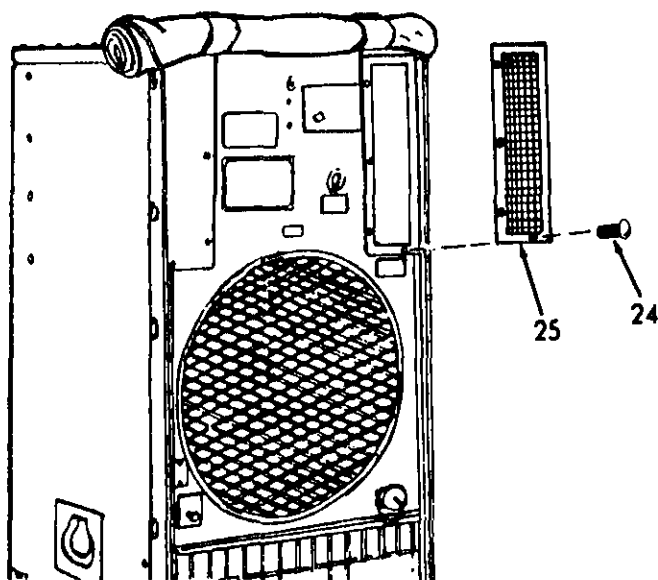


W - Weekly

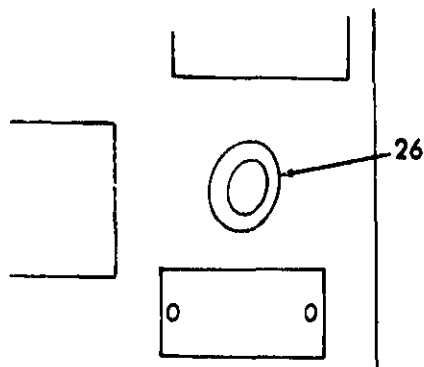
M - Monthly

Q - Quarterly

Interval		ITEM TO BE INSPECTED	PROCEDURE	Equipment Not Re- Available
M	Q			
		FRESH AIR SCREEN	Remove screws (24) that attach screen (25) to case. Clean with cleaning solvent (item 3, table E-1) and dry with compressed air. Reinstall after cleaning.	



SIGHT GLASS



Inspect sight glass (26) for bubbles and color condition. If bubbles are observed after 20 minutes of cooling operation, the refrigerant charge is low. If a green-yellow or yellow color is seen after one hour of operation, the refrigerant system may contain moisture. Report either condition to Direct Support Maintenance.

- CONTROLS

Check for proper operation.

- FAN

Check for unusual noise or vibration.

- WIRING

Check for worn or frayed insulation.

- EVAPORATOR AND CONDENSER

Clean coils with a brush and low pressure compressed air.

2 lists the common malfunctions which you may find during inspection or maintenance of the air conditioner or its components. Perform the tests/inspections and corrective actions in the table.

This table cannot list all malfunctions that may occur, nor all inspections and corrective actions. If a malfunction is not corrected by listed corrective actions, notify the manufacturer.

4-2. Organizational Maintenance Troubleshooting

INSPECTION

CORRECTIVE ACTION

COMPRESSOR

Compressor will not start.

Check circuit breaker for tripped condition.

Reset circuit breaker. If compressor fails to start, test circuit breaker (para 4-30).

Check high and low pressure cut out switches for tripped condition. Reset pressure switches.

For compressor replacement refer to direct support maintenance.

Test fuses (para 4-29).

Test circuit breaker for defective condition (para 4-30).

Test for an open-circuit condition in the control circuit by means of a continuity check.

Replace component or wire causing open circuit (para 4-24 and 4-28).

compressor starts but immediately stops.

- Step 1. Repeat test or inspections in steps 1 and 2 and if compressor starts and immediately stops again, return condition to Direct Support Maintenance.

HEATING

Little or no heating capacity.

- Step 1. Check for loose electrical connections or faulty wiring.

Repair or replace wiring as necessary (para 4-45).

- Step 2. Test rotary selector switch and temperature control thermostat for faulty wiring.

Replace defective switch (para 4-25 and 4-26).

- Step 3. Test heater relay for faulty contact closure.

Replace defective relay (para 4-31).

- Step 4. Test for defective operation of heater high temperature cutout.

Replace defective thermostatic switch (para 4-43.1).

- Step 5. Test heater for open-circuited element.

Replace defective heaters (para 4-43.1).

RECTIVE ACTION

COOLING

ent cooling.

Observe sight-glass for low refrigerant charge (Table 4-1, Item 9).

low refrigerant charge is observed, refer to direct support maintenance.

Check for indications of defective solenoid valve operation.

ace defective solenoid valve coil (para 4-42.2). If solenoid valve is defective, refer to direct support maintenance.

Section V.

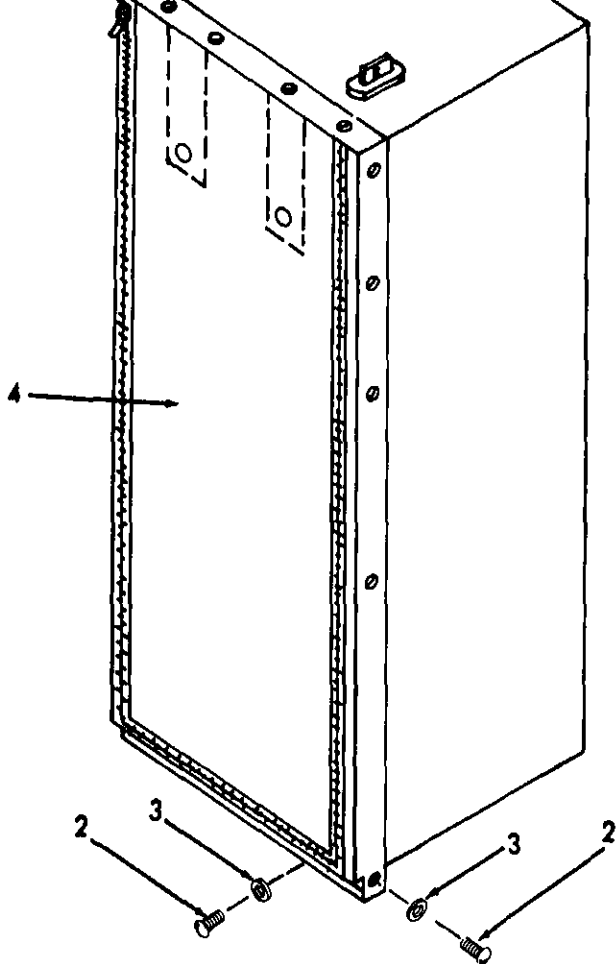
MAINTENANCE PROCEDURES

cedures in this section have been arranged in the order ns appear in the organizational (O) maintenance level Maintenance Allocation Chart (MAC) which is provided in Step-by-step-procedures have been provided for all actions to be performed by organizational maintenance in the order they appear on the MAC. Actions authorized to be performed by general support maintenance have been duly noted; procedures for these actions may be found in Chapters 5 and 6 respectively.

COVER.

on.

as cover is made of vinyl impregnated nylon cloth. Small grommets are sewn into the hems on the edges of the cover that are attached to the cabinet to give it shape. The back flap of the cover is in the closed position when closed by means of zippers at the sides. Two straps with eyelets in the ends are sewn into the top of the cover.



Removal.

- (1) Turn turn-lock fasteners (1) and roll canvas Zip the canvas cover closed.
- (2) Remove 18 screws (2) and washers (3) that attach cover (4) to the outer case.
- (3) Remove cover (4).

Inspection.

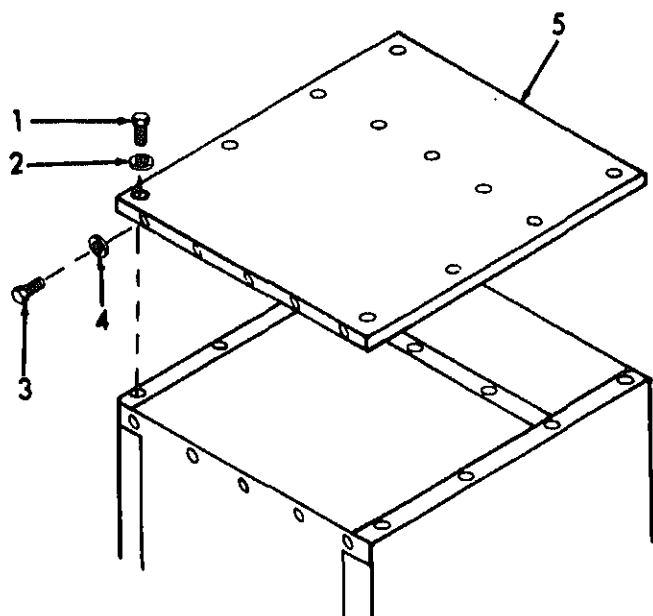
Inspect canvas cover for damage. Replace if

on.

panel is an assembly that encloses the top of the air cabinet. Gasket strips are glued to the bottom of the panel to form a seal. Insulation material is glued to the bottom of the panel to minimize heat gain/loss and sound transmission.

ry Procedure.

anvas cover (para 4-8).



Remove screws (1), and preformed packing (2).

Remove screws (3), and washers (4).

Remove top panel assembly (5).

on and Replacement.

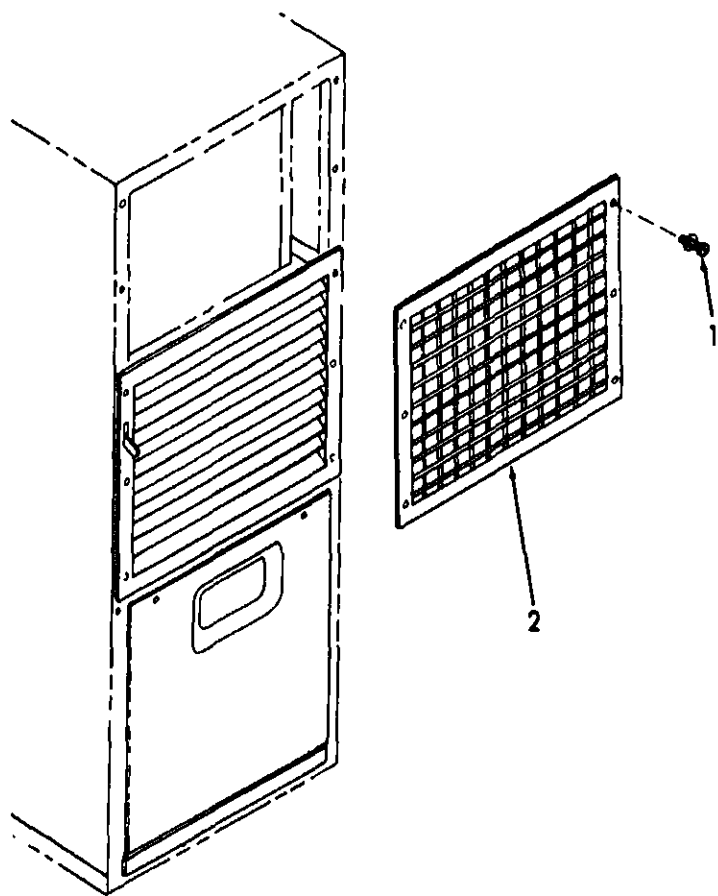
Inspect for loose or damaged gaskets.

Replace damaged gasket material and secure gaskets with adhesive (Item 2, table E-1).

AIR DISCHARGE GRILLE.

cription.

e grille is equipped with two sets of independently mounted horizontal blades. The horizontal blades can be positioned to direct the air flow up or downward. The vertical blades can be positioned to direct the air flow to one or both sides of the center.



moval.

- (1) Twist turnbutton fasteners (1).
- (2) Remove air discharge grille (2).

cleaning solvent, P-D-680 (item 3, table E-1), to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F (38°C).

Brush off loose dirt or foreign matter.

Wipe louvers with a cloth dampened with dry cleaning solvent, (item 3, table E-1).

and Repair.

Inspect for bent or broken louver blades.

Straighten bent louver blades with standard pliers.

Inspect for loose or damaged gaskets.

Replace damaged gasket material and secure gaskets with adhesive (item 2, table E-1).

Maintenance procedure for replacing screw turnlock.

on.

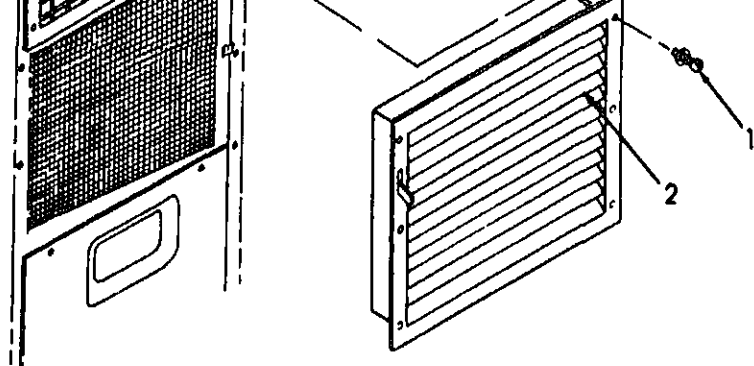
Align holes in air discharge grille with holes in housing.

Attach air discharge grille (2) with turnbutton fasteners (1).

TAKE GRILLE.

n.

e is equipped with blades which are connected by hinge so that all blades open or close together. This is to control the volume of air passing through the grill. In turn, the volume of air drawn in through the grille when the damper is open.



oval.

- (1) Twist turnbutton fasteners (1).
- (2) Remove air intake grille (2) from housing.

vice.

WARNING

Dry cleaning solvent P-D-680 (item 3, table E-1), used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F (38°C).

- (1) Brush off loose dirt or foreign matter.
- (2) Wipe louvers with a cloth moistened with dry cleaning solvent, (item 3, table E-1).

Inspection and Repair.

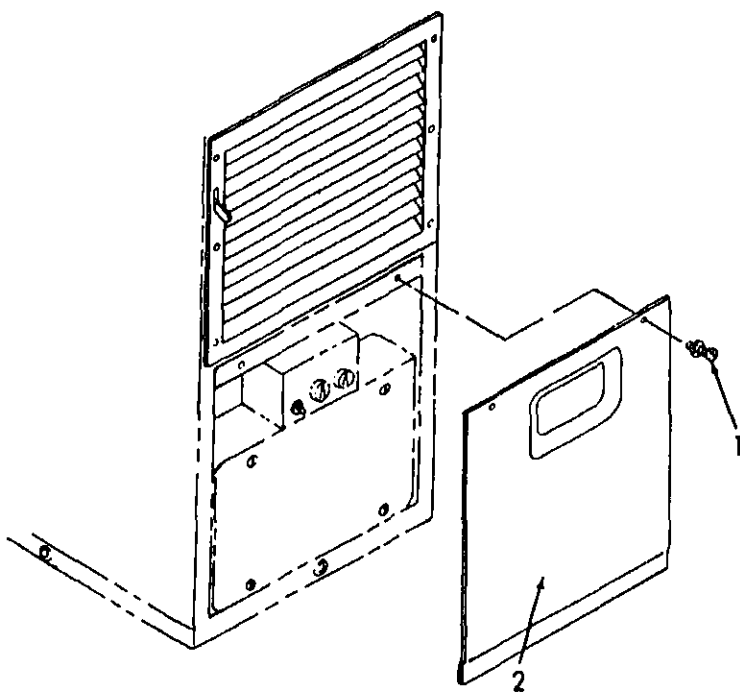
- (1) Inspect for bent or broken louver blades.
- (2) Straighten bent louver blades with standard pliers.
- (3) Inspect for loose or damaged gaskets.

Align holes in air intake grille with holes in housing.
Secure air intake grille (2) with turnbutton fasteners (1).

PANEL.

on.

Panel encloses and seals the lower front area of the unit. It contains a depressed cutout opening to provide access to the control panel. The opening is sealed with an RFI-
shielding gasket. The wiring diagram is located on the back side of the panel.



Loosen panel fasteners (1).

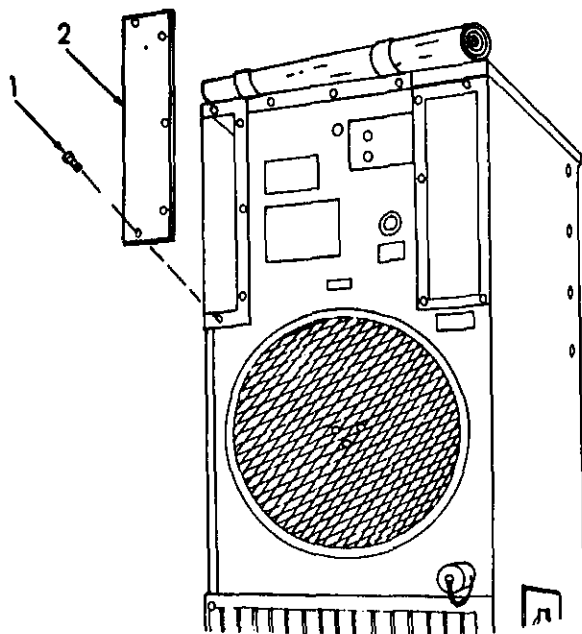
Remove lower panel (2).

Inspection and Repair.

Inspect for loose or damaged gaskets.

Replace damaged gasket material and secure gaskets with
adhesive (Item 2, table E-1).

the opening is closed by a sheet metal cover.



b. Preliminary Requirements.

Remove canvas cover (para 4-8).

c. Removal.

(1) Remove screws (1) that attach CBR cover

(2) Remove cover.

d. Installation.

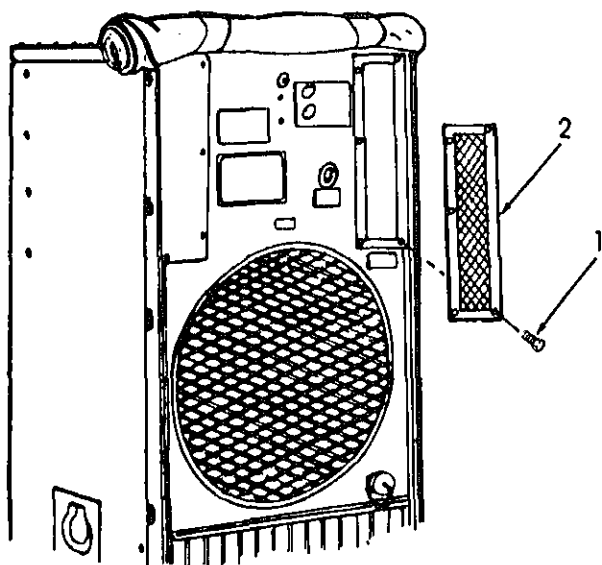
(1) Align holes in CBR cover with holes in

(2) Install cover (2) using screws (1).

(3) Install canvas cover (para 4-8),

ption.

fresh air screen is mounted on the upper right corner of the face of the air conditioner. It encloses the two refrigerant valves, and prevents leaves and other debris from entering the air intake opening.



Primary Requirements.

Use canvas cover, (para 4-8).

al.

(1) Remove screws (1) securing fresh air screen (2) to

(2) Remove fresh air screen.

ction and Service.

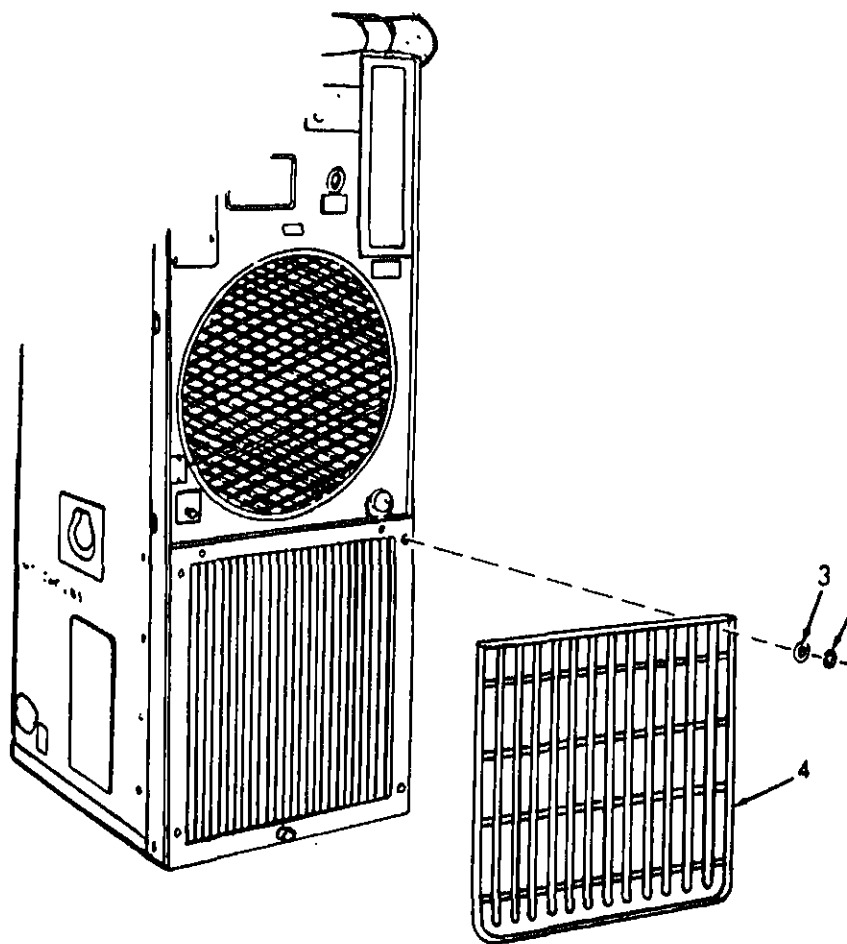
WARNING

Dry cleaning solvent, P-D-680 (item 3, table E-1), used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or

-15. CONDENSER COIL GUARD.

. Description.

The condenser coil guard occupies the bottom one-third rear surface of the air conditioner. It is aluminum fabric consisting of a grid of 3/16-inch aluminum rods in a frame angle. The face of the guard is covered with 16-mesh aluminum cloth to prevent the entry of leaves and other small debris. The guard is secured to the casing of the air conditioner with washers.



) Remove screws (1), lock-washers (2) and flat washers securing condenser coil guard (4) to housing.

) Remove condenser coil guard.

and Inspection.

WARNING

ry cleaning solvent, P-D-680, (item 3, table E-1), used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100⁰F (38⁰C).

) Brush off loose dirt or foreign matter.

) Wipe condenser coil guard with a cloth moistened with drycleaning solvent, (item 8, table E-1).

) Inspect condenser coil guard for damage.

ation.

) Align holes in condenser guard with holes in housing

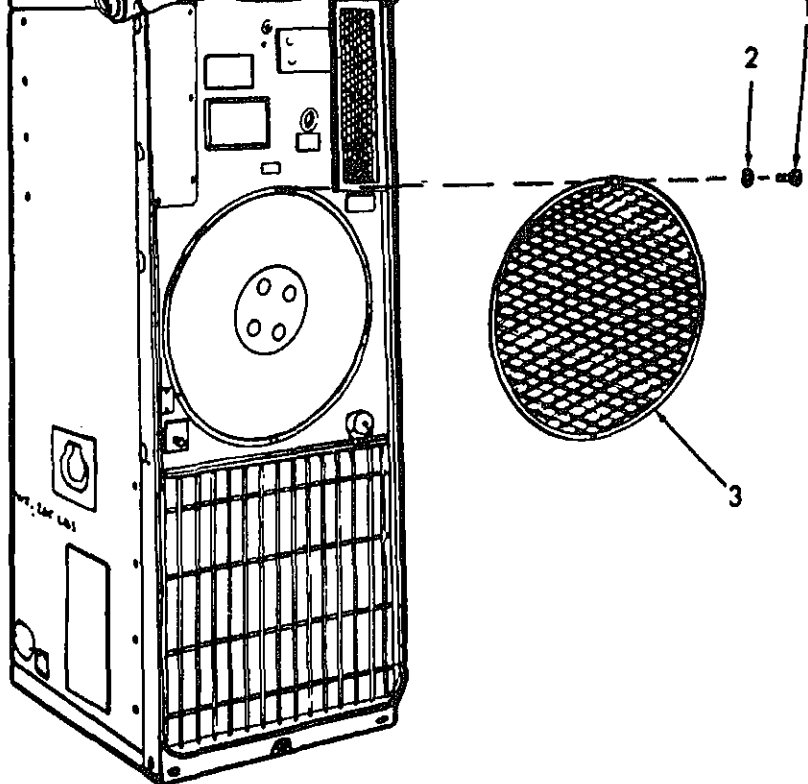
) Secure condenser coil guard (4) with screws (1), lockwashers (2), and flat washers (3).

) Install canvas cover (para 4-8).

ENSER FAN GUARD.

tion

Condenser fan guard is mounted near the middle of the rear of the air conditioner. The guard is fabricated from heavy-gauged metal mesh mounted in a circular sheet-metal frame. The screw holes in the frame are purposely arranged in a circular pattern, so that the fan guard can be installed in only one position. This installation is necessary to orient the angle of the fan guard so that hot exhaust air will be deflected upward, away from the condenser coil intake.



Removal

- (1) Remove screws (1) and lockwashers (2) securing fan guard (3) to housing.
- (2) Remove condenser fan guard.

Service and Inspection.

WARNING

Dry cleaning solvent, P-D-680, (item 3, table E-1), used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F (38°C).

- (1) Brush off loose dirt or foreign matter.

(2) Secure condenser fan guard (3) with screws (1) and lockwashers (2).

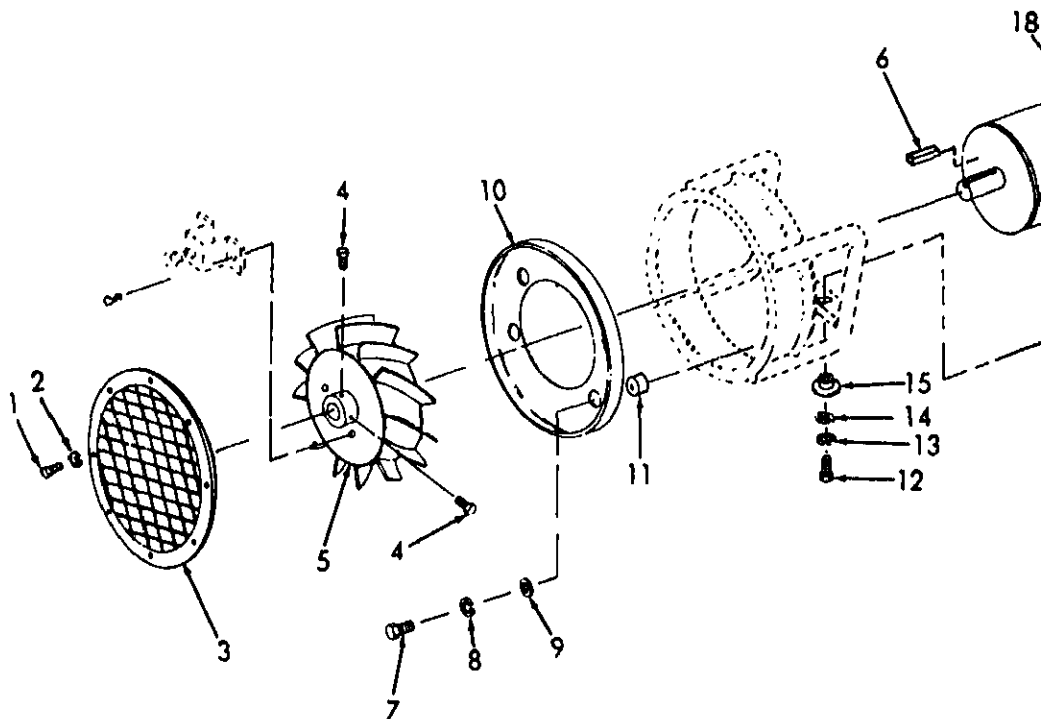
7. MOTOR SUPPORT.

Description.

The two-speed fan motor support is a welded fabrication of sheet metal which supports the rear end of the motor. It is attached to the rear panel with rivet nuts which are used to attach the condenser fan guard to the unit.

Special Tools

Wheel puller.



Preliminary Requirements,

Remove Canvas Cover (para 4-8) or roll up and secure with straps.

Removal.

(1) Remove screws (1), and washers (2) that attach

attach baffle (10) and bushings (11).

- (7) Remove baffle (10) and bushings (11).
- (8) Remove screws (12), lockwashers (13), and washers (14).
- (9) Remove grommet (15), motor mount bushing (16) and shim (17) from under motor (18).

Inspection.

- (1) Inspect motor mount bushing. Replace if defective.
- (2) Four bushing sizes are available as follows:
 - (a) 13215E9824 -1, 0.094 inch
 - (b) 13215E9824 -2, 0.125 inch
 - (c) 13215E9824 -3, 0.156 inch
 - (d) 13215E9824 -4, 0.188 inch

Installation.

- (1) Install proper bushing (16) into base of motor.
- (2) Insert shim (17), grommet (15).
- (3) Install screw (12), lockwasher (13), washer (14).
- (4) Install baffle (10) and bushing (11), using screw (12), lockwasher (13), and washer (14).

CAUTION

Do not hammer the impeller onto the motor shaft. The motor bearings would be damaged. If difficulty is encountered, dress out rough spots on the shaft with a fine file, stone or abrasive cloth. Apply a coating of light oil to ease assembly.

- (5) Align key ways in shaft and impeller, install and press impeller (5) onto shaft. The end of the shaft should be even with the face of the hub of the impeller is completely in position. Tighten (4) finger tight. Starting with the keyway, tighten to a final torque of 2 1/2 ft. lbs.

on the intake, the condenser fan guard is designed that it can be installed in only one way. All screws must match to permit proper installation.

Install condenser fan guard (3) using screws (1) and lockwasher (2).

) Install canvas cover (para 4-8), if required.

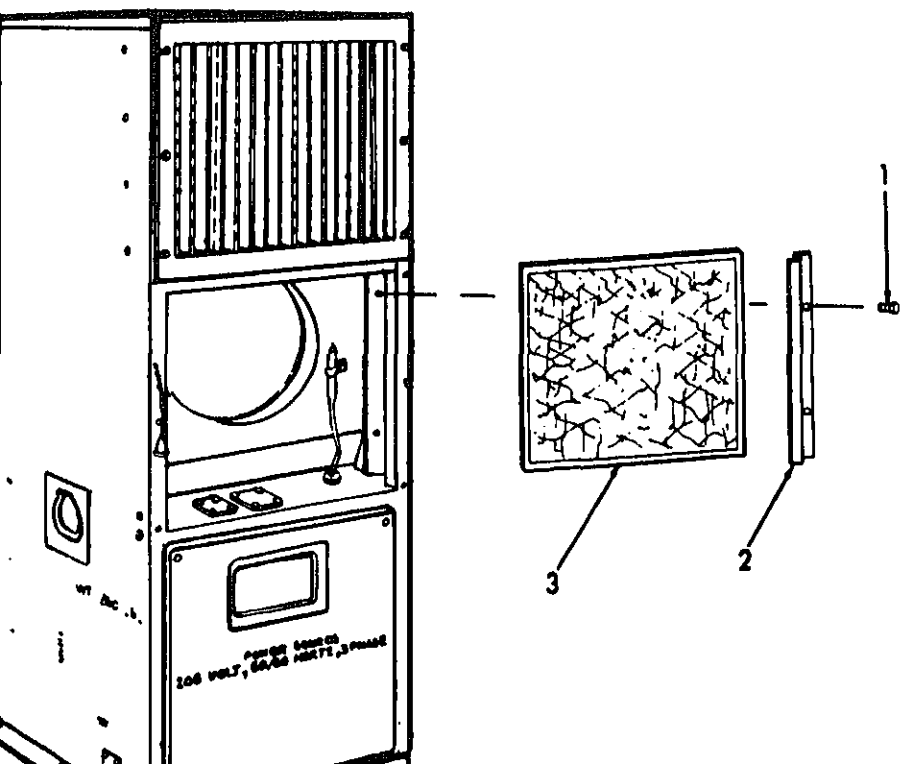
ILTER.

ion.

filter consists of a shredded aluminum foil maze held in an aluminum channel frame. The filter can be re-used repeatedly. Airflow markings (arrows) printed on it make it easy to replace the filter in the correct position.

ary Procedure:

move air intake grille (para 4-11).



d. Service and Inspection.

WARNING

Do not use compressed air for cleaning purposes except where reduced to less than 30 psi and the with effective chip guarding and personal protective equipment.

WARNING

Dry cleaning solvent P-D-680, (item 3, table E-1) used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F (38°C).

- (1) Clean air filter with dry cleaning solvent (table E-1) or warm soapy water.
- (2) Dry air filter with low pressure compressed air.
- (3) Inspect air filter for damaged or clogged.
- (4) Replace air filter if damage is indicated.
- (5) Spray air filter with Filter-Kote (item 5).

e. Installation

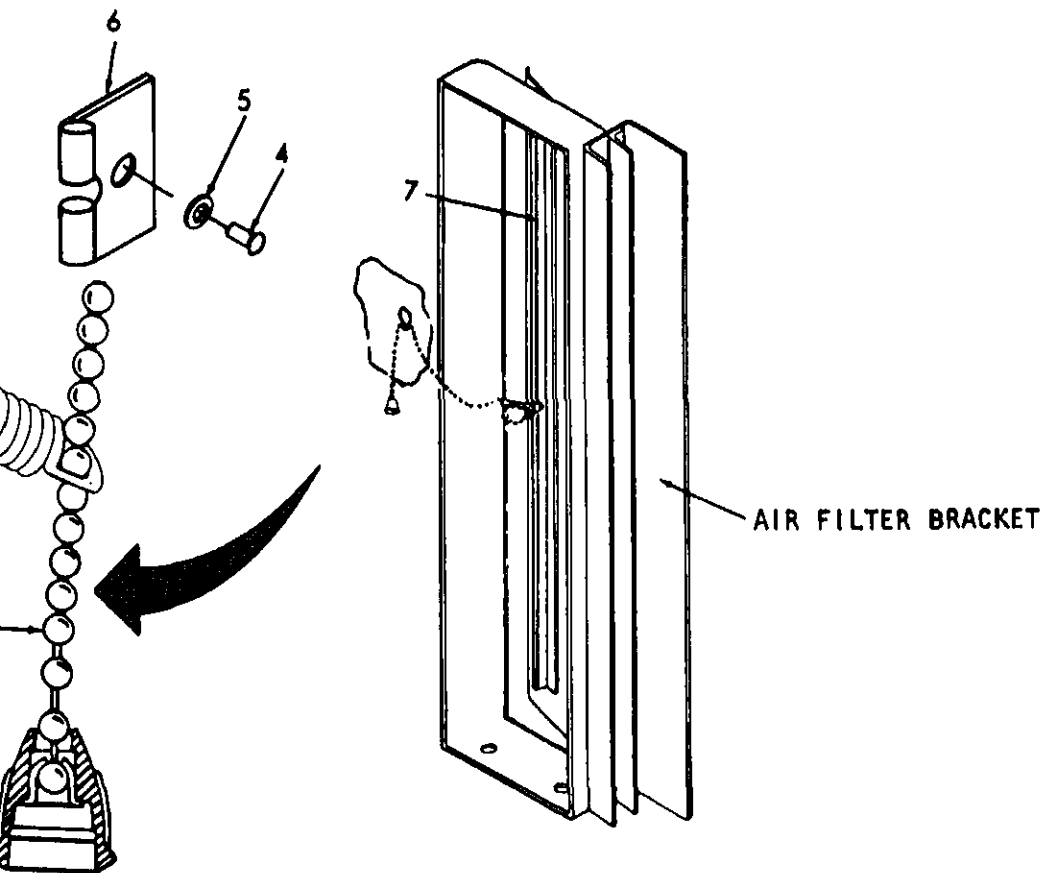
- (1) Install air filter (3) in housing with the indicator in proper position.
- (2) Align holes in air filter retaining bracket with holes in housing.
- (3) Secure air filter retaining bracket (2) with fasteners (1).
- (4) Install air intake grille (para 4-11).

s except fully closed and acts as a snubber to minimize sudden closing of the damper door.

ary Procedures:

Remove air intake grille (para 4-11).

Remove air filter (para 4-18).



Unsnap pendant (1) from chain (2).

Remove pendant (1).

Unhook spring (3) from chain (2) and housing.

Remove chain (2).

h. Inspection and Repair.

- (1) Inspect pendant, spring and fresh air damper damage.
- (2) Replace pendant, spring, and chain if damage indicated.

i. Installation.

- (1) Align holes in chain retainer (6) and flat washer with hole in housing.
- (2) Secure chain retainer (6) and flat washer (4).

NOTE

Rivet must be flat so that door will open and close properly.

- (3) Insert one end of spring (3) into hole in housing.
- (4) Hook the other end of spring around chain.
- (5) Align slot in pendant (1) between the last link of chain (2).
- (6) Snap pendant (1) onto chain (2).
- (7) Install air filter (para 4-18).
- (8) Install air intake grille (para 4-11).

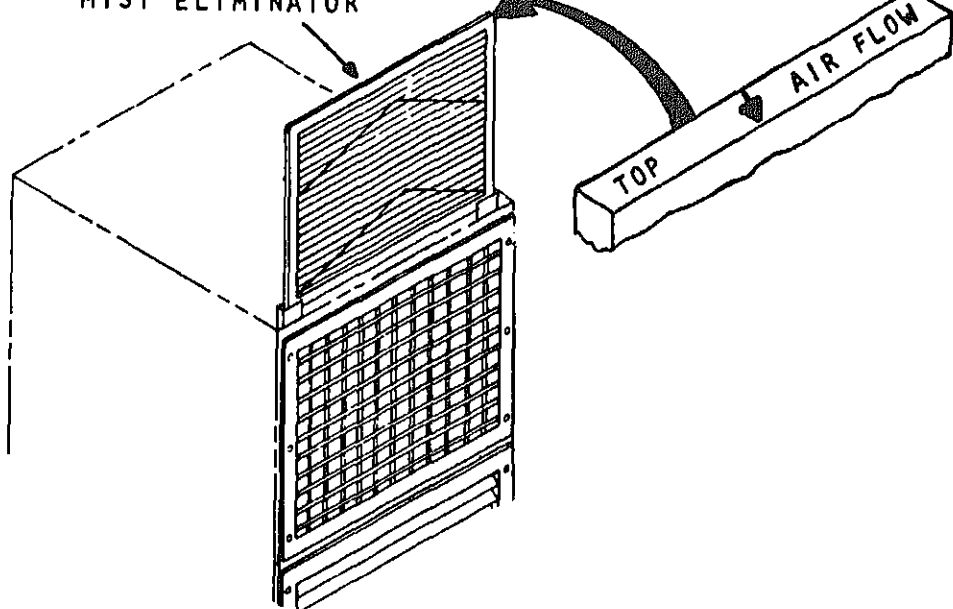
4-20. MIST ELIMINATOR.

a. Description.

The mist eliminator is composed of eight double layer aluminum mesh held between 1/4-inch mesh panels in an aluminum frame. The purpose of the mist eliminator is to trap droplets of condensed refrigerant formed on the evaporator coil, so that they will not be blown into the conditioned space.

b. Preliminary Procedure:

- (1) Remove canvas cover (para 4-8).



Pull mist eliminator up and out of housing.

and Inspection.

WARNING

Dry cleaning solvent, P-D-680 (item 3, table E-1), used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F (38°C).

WARNING

Do not use compressed air for cleaning purposes except where reduced to less than 30 psi and then only with effective chip guarding and personal protective equipment.

1) Clean mist eliminator with warm soapy water or dry cleaning solvent (item 3, table E-1).

AIR FLOW arrows indicating the direction of air flow from the evaporator coil.

- (1) Locate the TOP and AIR FLOW arrows on the mist eliminator.
- (2) With the TOP of the mist eliminator at the housing and AIR FLOW arrows pointing toward housing, install it in the mist eliminator housing.
- (3) Install top panel, (para 4-9).
- (4) Install canvas cover (para 4-8).

4-21. BLOCK-OFF PANEL.

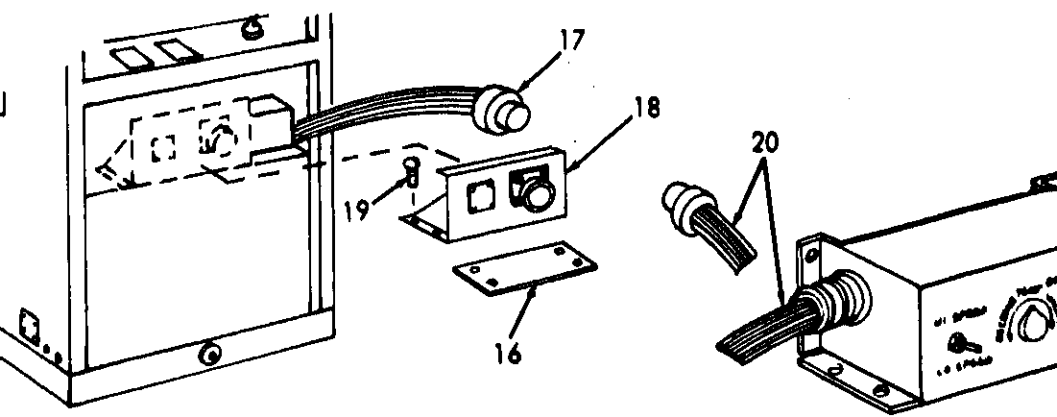
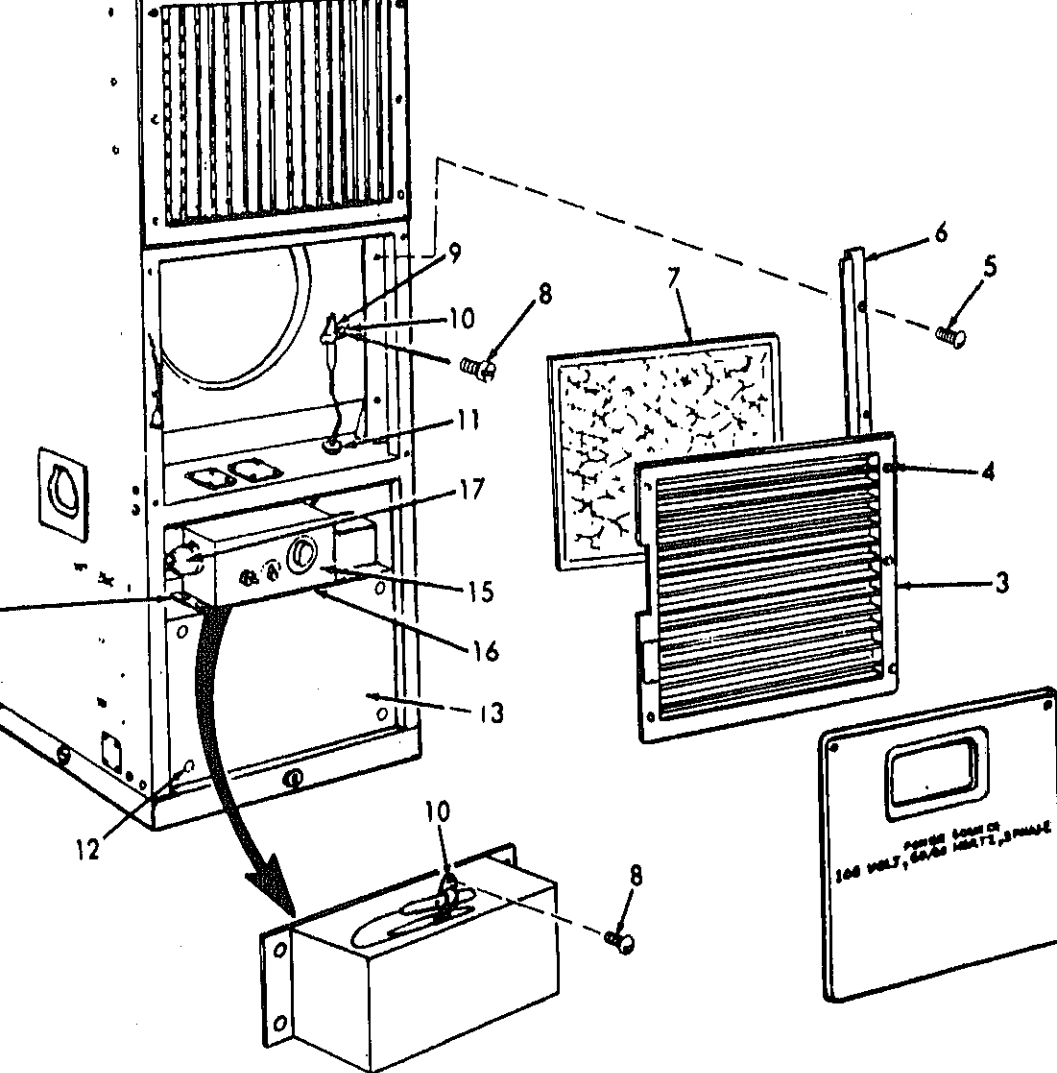
The block-off panel may be installed when the controls are removed from the air conditioner to operate the unit by manual control. To install the block-off panel and relocate the control panel proceed as follows:

- (1) Disconnect electrical power from air conditioner.
- (2) Remove lower panel (1), by loosening two turn-button fasteners (2).
- (3) Remove air intake grille (3) by loosening two turn-button fasteners (4).
- (4) Remove screw (5), filter retainer (6), and filter (7).
- (5) Remove screw (8) securing thermostat tube bracket clamp (10). Route bulb and tube through grommet (11).
- (6) Loosen four turn-button fasteners (12) that secure junction box (13) to air conditioner.

CAUTION

When performing the following procedures. Do not bend bulb or tube (9).

- (7) Carefully remove the junction box (13) from the air conditioner.
- (8) Remove four turn-button fasteners (14) that secure control panel (15) and gasket (16) to junction box (13).



(11) Attach electrical connector (17) to block off
8).

(12) Install block-off assembly (18), using gasket
screws (19) to junction box (13).

NOTE

Replace gasket if damaged or defective.

(13) Reinstall junction box (13), and tighten turn
screws (12).

(14) Reinstall air intake filter and air intake gr
performing step 4 and step 3, above, in reverse order of re

(15) Connect remote control cable (20) to block-of
d control panel.

(16) Locate control panel as required.

NOTE

Remote control connection can be made as above o
by removing the electrical connector from the blo
off assembly and installing it in one of the alte
nate electrical connection locations shown on fig
4-3.

22. INSTRUCTION PLATES

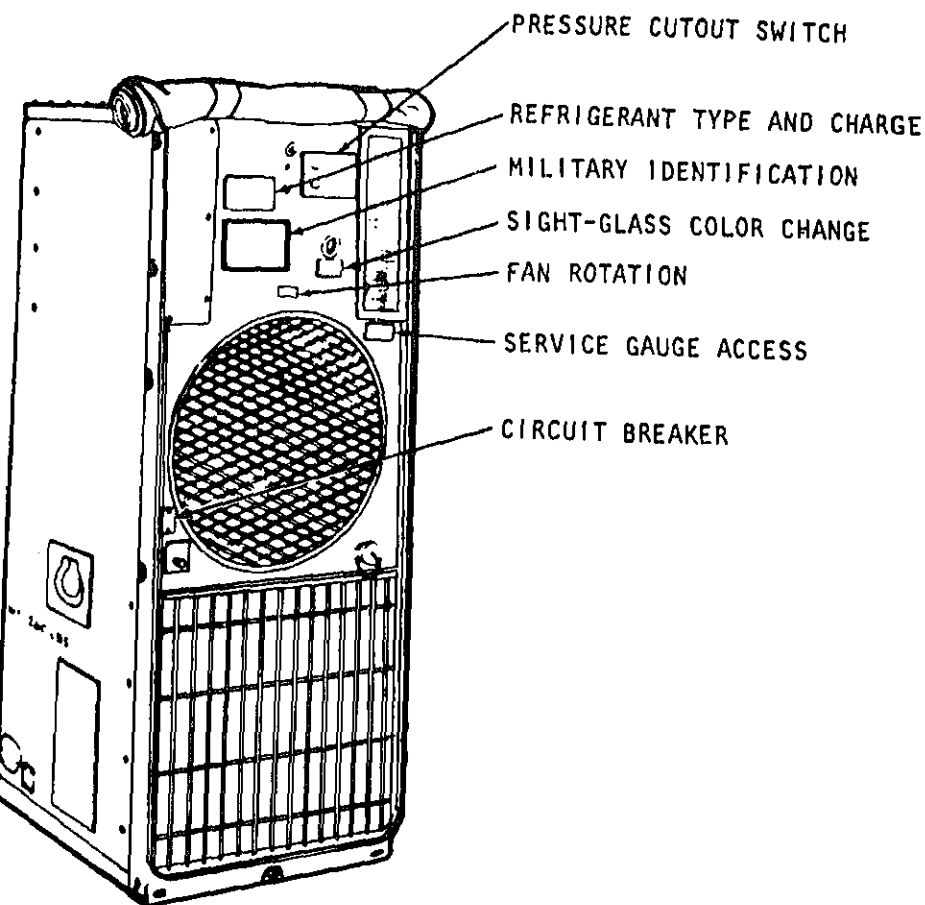
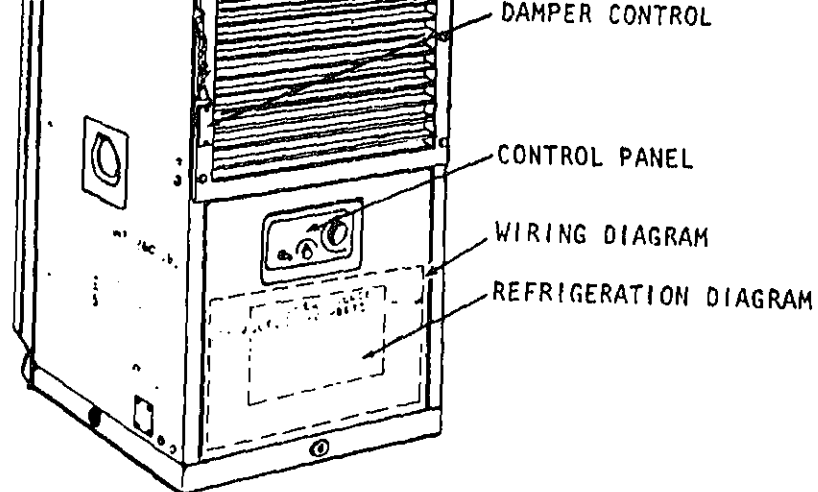
Preliminary Procedures:

- (1) Remove lower panel (para 4-12).
- (2) Remove control panel (para 4-24).
- (3) Remove rotary selector switch (para 4-25).
- (4) Remove temperature control thermostat (para 4-26).
- (5) Remove Fan Speed switch (para 4-27).

Removal.

Front of Housing

Wiring Diagram Plate



- 1 - Drill out rivets that secure the control plate to the control panel.

- 2 - Remove control panel designation plate.

Rear of Housing

Circuit Breaker Reset Information Plate

- 1 - Drill out blind rivets that secure the circuit breaker reset information plate to the rear of housing.

- 2 - Remove circuit breaker reset information plate.

Fan Rotation Indicating Plate

- 1 - Drill out blind rivets that secure the fan rotation indicating plate to the rear of housing.

- 2 - Remove fan rotation indicating plate.

Pressure Cut-Out Switch Information Plate

- 1 - Drill out blind rivets that secure the pressure cut-out switch information plate.

- 2 - Remove pressure cut-out switch information plate.

Moisture Indicator Information Plate

- 1 - Drill out blind rivets that secure the moisture indicator information plate to the rear of housing.

- 2 - Remove moisture indicator information plate.

Refrigeration Information Plate

- 1 - Drill out blind rivets that secure the refrigeration information plate to rear of housing.

- 2 - Remove refrigeration information plate.

Service Gauge Valves Instruction Plate

- 1 - Drill out blind rivets that secure the service gauge valves instruction plate.

- 2 - Remove service gauge valves instruction plate.

Instructions Plates with blind rivets, or adhesive as

CONDENSATE DRAINAGE SYSTEM.

tion.

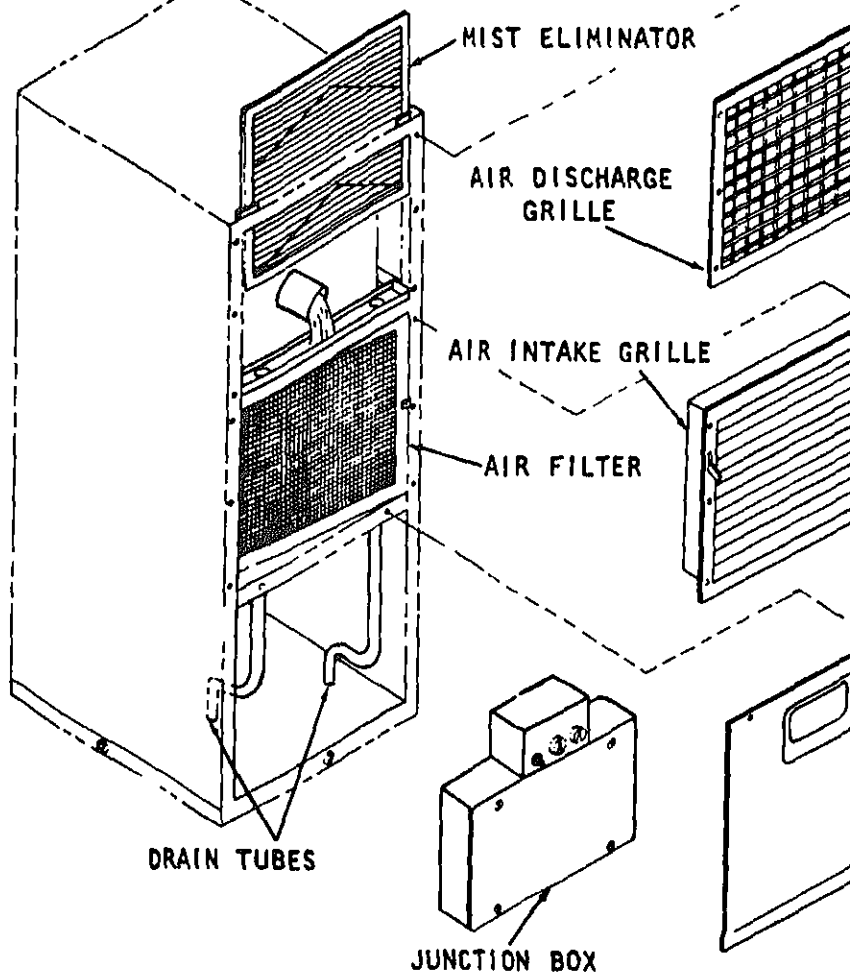
The condensate drainage system consists of a drip pan, mounted below the evaporator coil, and two tubes leading from the ends of the coil to the base plate. The tubes are equipped with spring-loaded check valves at their bottom ends, to prevent the bypass of air through the tubes and around the evaporator intake. The condensate pan of the air conditioner is fitted with pipe-threaded holes for the attachment of standard plumbing fittings or hose to conduct the condensate to a remote location.

The condensate drainage system occupies both sides of the base plate of the air conditioner from top to bottom, the top panel, lower panel, and each evaporator grilles must be removed to gain access to the condensate pan, the air filter and the mist eliminator must be removed.

CONDENSATE PAN ASSEMBLY.

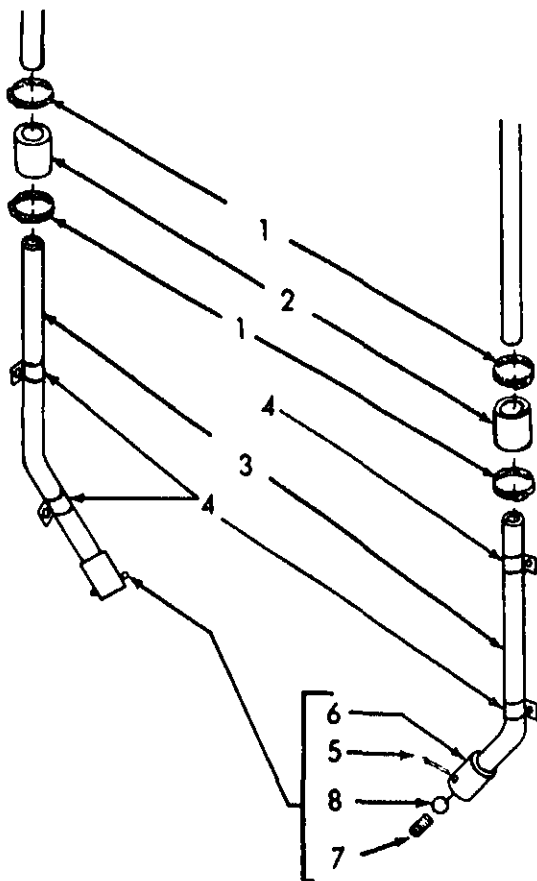
Removal Procedures.

- Remove canvas cover (para 4-8).
- Remove top panel (para 4-9).
- Remove air discharge grille (para 4-10).
- Remove mist eliminator (para 4-20).
- Remove air filter (para 4-18).
- Remove lower panel (para 4-12).
- Remove junction box (para 4-28).



b. Inspection/Test.

Place a 2 by 4 inch board under one side of the a to tilt it slightly, then pour about one pint (one-half water into the lower end of the drip pan below the eva Verify that the water flows out of the drip pan through tube. Tilt the air conditioner the opposite direction flow test on the other side. Water should drain free tubes. If it does not, remove and repair or replace (refer to para 4-23.2).



in Tubes.

Loose hose clamps (1) securing hoses (2) to drain tubes (3).

Remove hoses (2) and clamps (1).

Pull drain tubes (3) out of spring clips (4).

1 Check Assemblies

Remove cotter pin (5) from ball check seat (6).

Remove spring (7) and ball (8) from ball check seat (6).

Dry cleaning solvent, P-D-680, (item 3, table E-1) used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100°F (38°C).

- (1) Flush out hoses and tubing with warm soapy water.
- (2) Use a small diameter brush or piece of soft wire to clean out any accumulation of dirt or foreign matter from hoses and tubing.
- (3) Inspect hoses and tubing for split or deteriorated condition.
- (4) Clean ball and spring in dry cleaning solvent (table E-1) and dry thoroughly.
- (5) Inspect ball and spring for damage.
- (6) Replace any defective parts.

Installation.

Ball Check Assemblies

- (1) Install ball (8) and spring (7) into ball check (6).
- (2) Secure ball and spring with cotter pin (5).

Drain Tubes

- (1) Press drain tube (3) into spring clips (4) in housing.
- (2) Install hose clamps (1) and hoses (2).

Final Installation (install the following as needed.)

- (1) Install junction box (para 4-28).
- (2) Install lower panel (para 4-12).
- (3) Install air filter (para 4-18).
- (4) Install mist eliminator (para 4-20).

CONTROL PANEL.

ption.

Control panel assembly is mounted on top of the junction of the lower panel. It contains the three controls by means of which the functions of the air conditioner are controlled. These controls comprise the following: Rotary Selector Switch, Temperature Control Thermostat and a Two-Speed Fan Switch.

WARNING

Disconnect power from the air conditioner before performing maintenance on the electrical system. The voltage used can be lethal.

Following requirements are necessary for organizational maintenance of the control panel.

Equipment: Multimeter

Special Tools: None

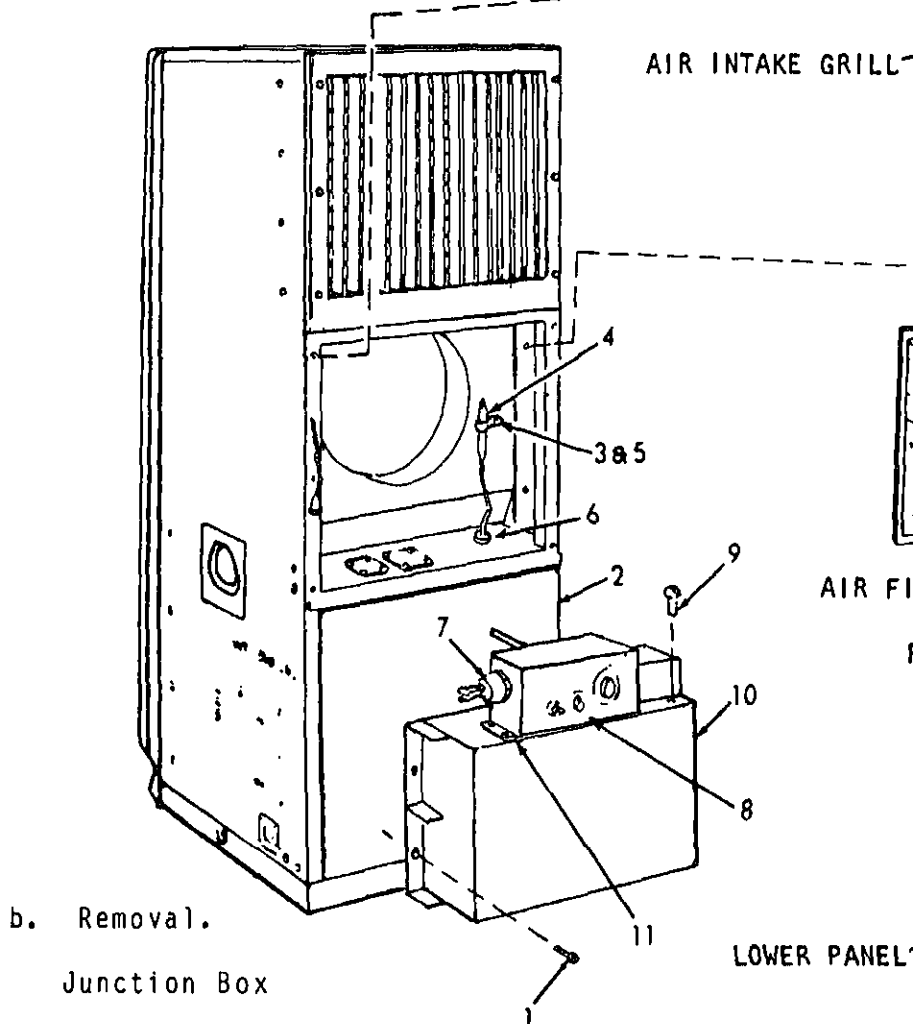
Special Environmental Conditions: None

Special Safety Precautions:

- o Disconnect the unit from source of power.

Primary Procedures:

- o Remove lower panel (para 4-12).
- o Remove air intake grille (para 4-11).
- o Remove air filter (para 4-18).



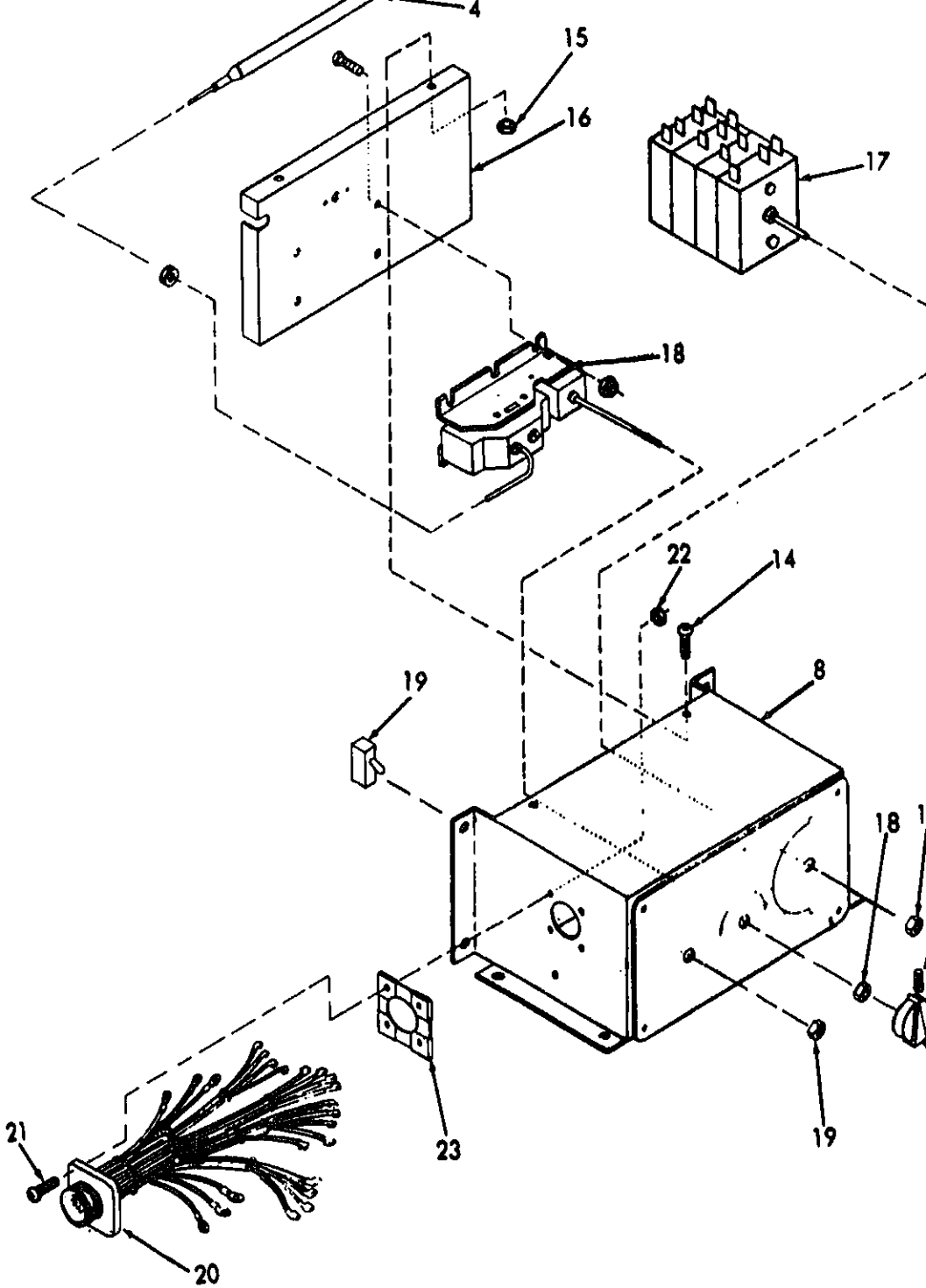
- (1) Loosen fasteners (1) that attach junction box (2).
- (2) Move junction box as needed for access.

CAUTION

Use care to prevent kinking of the thermocouple or thermistat sensing element when removing thermostat sensing element.

Thermostat Sensing Element

- (1) Loosen screw (3) securing thermostat sensing element in clamp (5).



- (2) Remove screws (5), securing control panel box (10).
- (3) Remove control panel (8) and gasket (11) box (10).
- (4) Loosen setscrew (12) in knob (13).
- (5) Remove knob (13) from temperature control panel.
- (6) Remove screws (14), nuts (15), and rear control panel.

c. Inspection and Repair.

Control Panel

- (1) Inspect gasket (11) for damage.
- (2) Replace gasket if damage is indicated.
- (3) Inspect all components and wiring connections for security of attachment.
- (4) Tighten any loose component or wiring connections.

Rotary Selector Switch

- (1) Inspect rotary selector switch (17) for damage.
- (2) Test and replace rotary selector switch if it is defective.

Temperature Control Thermostat

- (1) Inspect temperature control thermostat for damage.
- (2) Test and replace temperature control thermostat (para 4-26) if it is defective.

Fan speed (Toggle) Switch

- (1) Inspect toggle switch (19) for damage.
- (2) Test and replace toggle switch (para 4-26) if it is defective.

Electrical Connector (J7)

CAUTION

Electrical wires are still connected to the electrical connector. Use care when pulling it away from control panel cover.

- (b) Carefully pull electrical connector (20) away from control panel (8).
- (c) Tag and unsolder loose wires from solder wells.
- (d) Insert ends of wires in solder wells.
- (e) Solder (item 12, table E-1) wires in place and remove tags.
- (f) Align holes in electrical connector (20) and (23) with holes in control panel (8).
- (g) Secure electrical connector (20) with screws and nuts (22).

Electrical Connector Gasket

- 1) Remove screws (21) and nuts (22) securing electrical connector (20) to control panel (8).

CAUTION

Electrical wires are still connected to the electrical connector. Use care when pulling it away from control panel cover.

- 2) Carefully pull electrical connector (20) away from control panel (8).
- 3) Inspect gasket (23) for damage.
- 4) If gasket is damaged, proceed as follows:
 - (a) Tag and remove all control panel wiring harness electrical leads.
 - (b) Completely remove electrical connector (20).

(c) Secure gasket and electrical connector with screws (21) and nuts (22).

- (5) If gasket is NOT damaged, proceed as follows:
 - (a) Align holes in gasket (23) and hole connector (20) with holes in control panel.
 - (b) Secure gasket and electrical connector with screws (21), and nuts (22).

Knobs

- (1) Inspect knobs for damaged condition.
- (2) If damage is indicated, replace knob as follows:
 - (a) Loosen setscrew (12) in knob (13) and remove knob.
 - (b) Install new knob (13) and tighten setscrew (12).

d. Installation

Control Panel Cover

- (1) Align holes in cover (16) with holes in control panel (8).
- (2) Secure control panel cover with screws (15).

Control Panel

- (1) Align holes in control panel with holes in mounting box.
- (2) Secure control panel with screws (9).
- (3) Connect electrical connector (7) to control panel.

CAUTION

Use care to prevent kinking of the thermostat sensing bulb when installing thermostat sensing bulb.

(3) Install lower panel (para 4-12).

(4) Install control panel (para 4-24).

ostat Sensing Bulb

(1) Carefully slide sensing bulb (4) up through grommet (6).

(2) Install sensing bulb in clamp (5) and tighten screw (3).

ion Box

(1) Replace junction box (10).

(2) Turn turn-button fasteners (1).

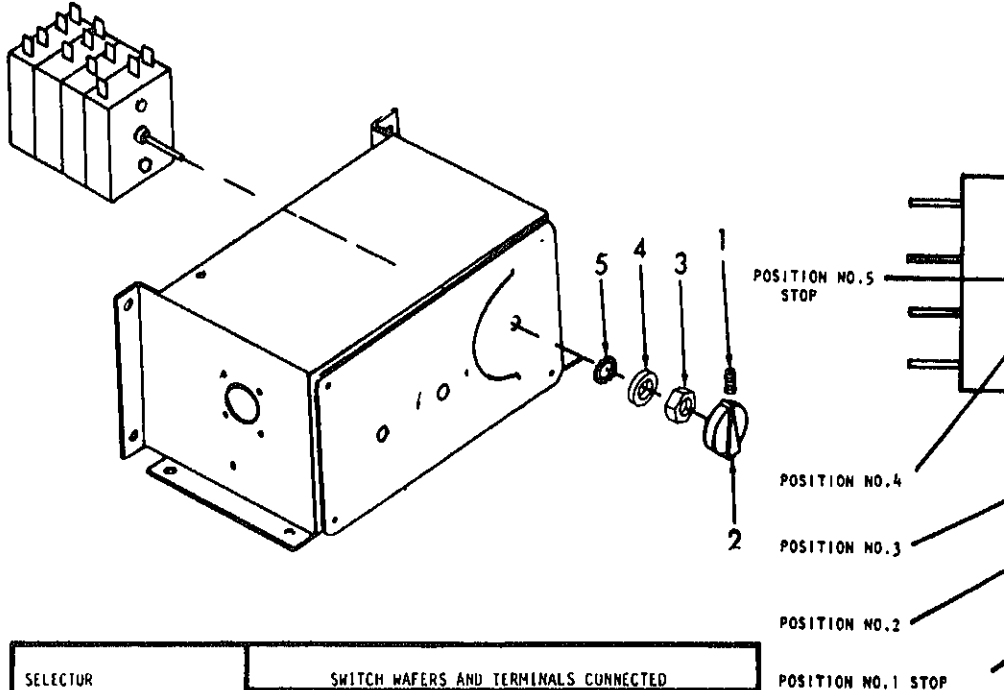
OTARY SELECTOR SWITCH (S1).

ription.

Rotary Selector Switch is a five-position rotary switch of four "wafers" or individual five-position elements. One of the switch connects various functional units in each position.

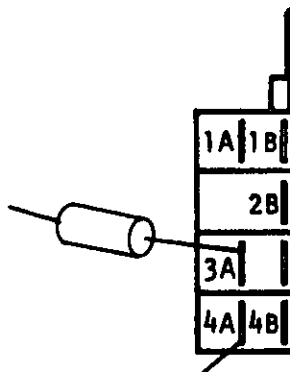
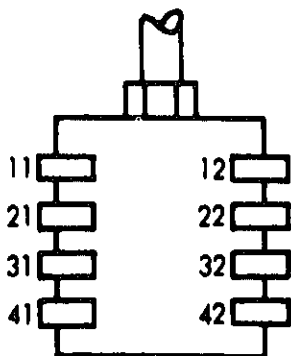
iminary Procedures:

Remove control panel (para 4-24).



SELECTOR SWITCH POSITION	SWITCH FUNCTION	SWITCH WAFERS AND TERMINALS CONNECTED			
		A	B	C	D
1	HEAT (HIGH)	12 AND 1A	21 AND 2C 22 AND 3A	31 AND 3C 32 AND 3A	41 AND 4C 42 AND 4A
2	HEAT (LOW)	12 AND 1A	21 AND 2C 22 AND 2B	31 AND 3C	
3	OFF				
4	VENT		21 AND 2C 22 AND 2B	31 AND 3C	
5	COOL	12 AND 1B 11 AND 1D	21 AND 2C 22 AND 2B	31 AND 3C 32 AND 3B	41 AND 4C 42 AND 4B

WIRING CHART



selector switch to control panel.

- (3) Tag and disconnect electrical leads from selector switch.
- (4) Remove selector switch.
- (1) Turn shaft of selector switch counter-clockwise until stops (POSITION 1).
- (2) Refer to wiring chart and check for continuity between terminals shown for wafers A, B, C and D, Position 1.
- (3) Turn shaft of selector switch clockwise one click to Position No. 2. Check for continuity between terminals shown for wafers A, B, and C, Position 2.
- (4) Turn shaft of selector switch clockwise two clicks to Position No. 4. Check for continuity between terminals shown for wafers B and C Position 4.
- (5) Turn shaft of selector switch clockwise one click to Position No. 5. Check for continuity between terminals shown for wafers A, B, C and D, Position No. 5.

Installation

- (1) Connect electrical leads to selector switch and remove tags.
- (2) Install selector switch shaft through hole in control panel.
- (3) Secure selector switch with lockwasher (5), washer and nut (3).
- (4) Install knob (2) and tighten setscrew (1).

Installation

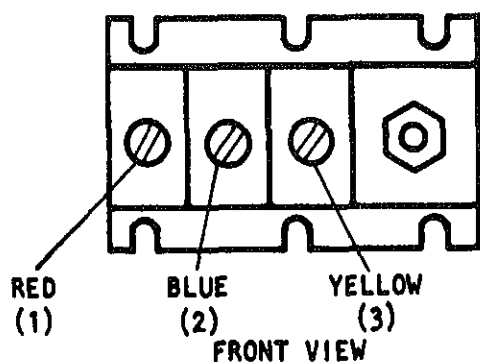
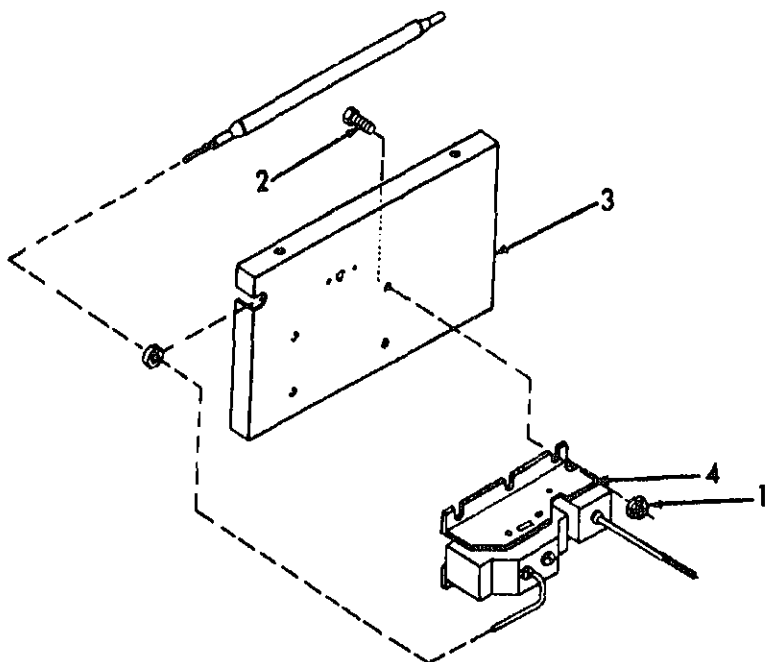
- (1) Install control panel (para 4-24).
- (2) Install lower panel (para 4-12).
- (3) Install air filter (para 4-18).

a. Description:

The Temperature Control and thermostat is set a temperature level to heat or cool the conditioned air with a feedback signal from a sensing bulb which can open or close on temperature rise or temperature drop.

b. Preliminary Procedures:

Remove control panel (para 4-24).



- (3) Remove thermostat.

ing

TEMPERATURE RISE CONTINUITY CHECK

- (1) Place temperature sensing bulb in a container of water at a temperature of 80° to 90°F (28° to 32°C).
- (2) While facing switch shaft, rotate shaft counterclockwise to limit.
- (3) Check continuity between terminal 1 (RED) and terminal 2 (YELLOW). Replace temperature control thermostat if open circuit is found.

TEMPERATURE DROP CONTINUITY CHECK

- (1) Place temperature sensing bulb in a container of water at a temperature of 40° to 50°F (4° to 10°C).
- (2) While facing switch shaft, rotate shaft clockwise to limit.
- (3) Check continuity between Terminal 1 (RED) and Terminal 2 (BLUE). Replace temperature control thermostat if open circuit is found.

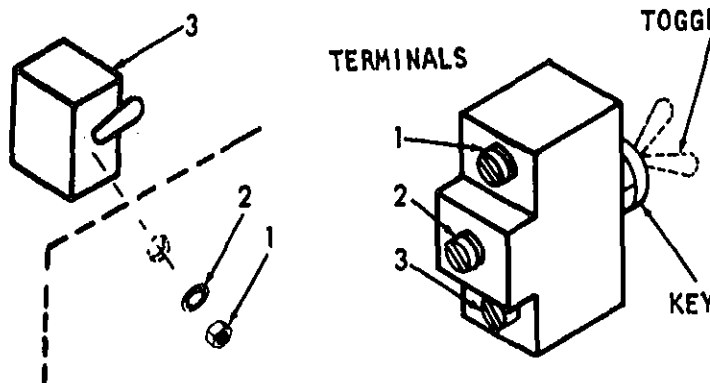
allation.

- (1) Connect electrical leads to thermostat and remove tags.
- (2) Attach thermostat (4) with screws (2) and nuts (1) to control panel (3).
- (3) Install control panel (para 4-24).
- (4) Install lower panel (para 4-12).
- (5) Install air filter (para 4-18).
- (6) Install air intake grille (para 4-11).

a. Description.
This two-position toggle switch connects or disconnects auxiliary set of windings in the evaporator/condenser connected, these windings double the speed of the motor 3450 rpm, thereby increasing airflow.

b. Preliminary Procedures:

Remove control panel (para 4-24).



c. Removal.

- (1) Tag and disconnect electrical leads from
- (2) Unscrew and remove nut (1) and lockwash toggle switch (3) to control panel.

d. Testing.

- (1) With keyway in downward position, press Check continuity between Terminals 1 and
- (2) With keyway in downward position, press Check continuity between Terminals 2 and
- (3) Replace two speed switch if an open circuit

e. Installation.

- (1) Install toggle switch lever through hole in panel.
- (2) Secure toggle switch (3) with lockwasher (1).
- (3) Connect electrical leads to terminals

7) Install air intake grille (para 4-11).

FUNCTION BOX

tion.

unction box is located just inside the lower panel. It provides wiring or mounting facilities for the electrical components that control the automatic switching of power and control circuits for the operating components of the air conditioner. These components include the control transformer, rectifier, armature relays, contactor, relay, the circuit breaker, and associated fuses and terminals.

WARNING

Disconnect power from the air conditioner before performing maintenance on the electrical system. The voltage used can be lethal.

Following requirements are necessary for organizational maintenance of the junction box.

Equipment: Multimeter
Power Supply capable of producing 28 VDC \pm 1V

Special Tools: None

Special Environmental Conditions: None

Special Safety Precautions:

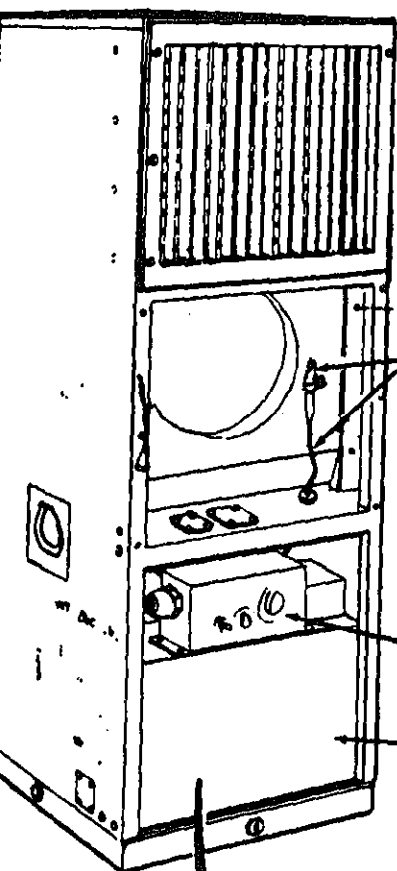
1) Disconnect the unit from source of power.

Primary Procedures:

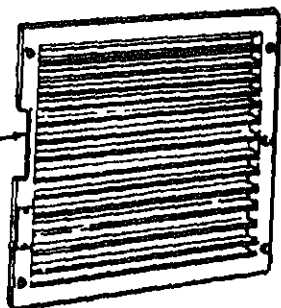
1) Remove lower panel (para 4-12).

2) Remove air intake grille (para 4-11).

3) Remove air filter (para 4-18).



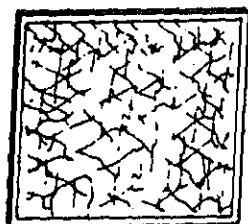
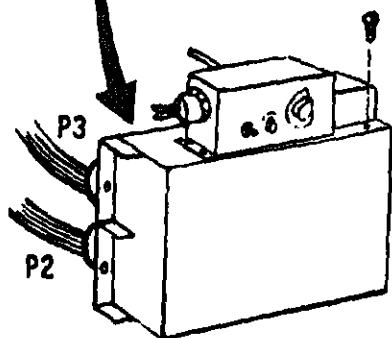
AIR INTAKE GRILLE



DO NOT BEND
TUBE OR BULB

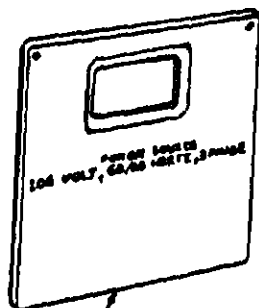
CONTROL PANEL

JUNCTION BOX

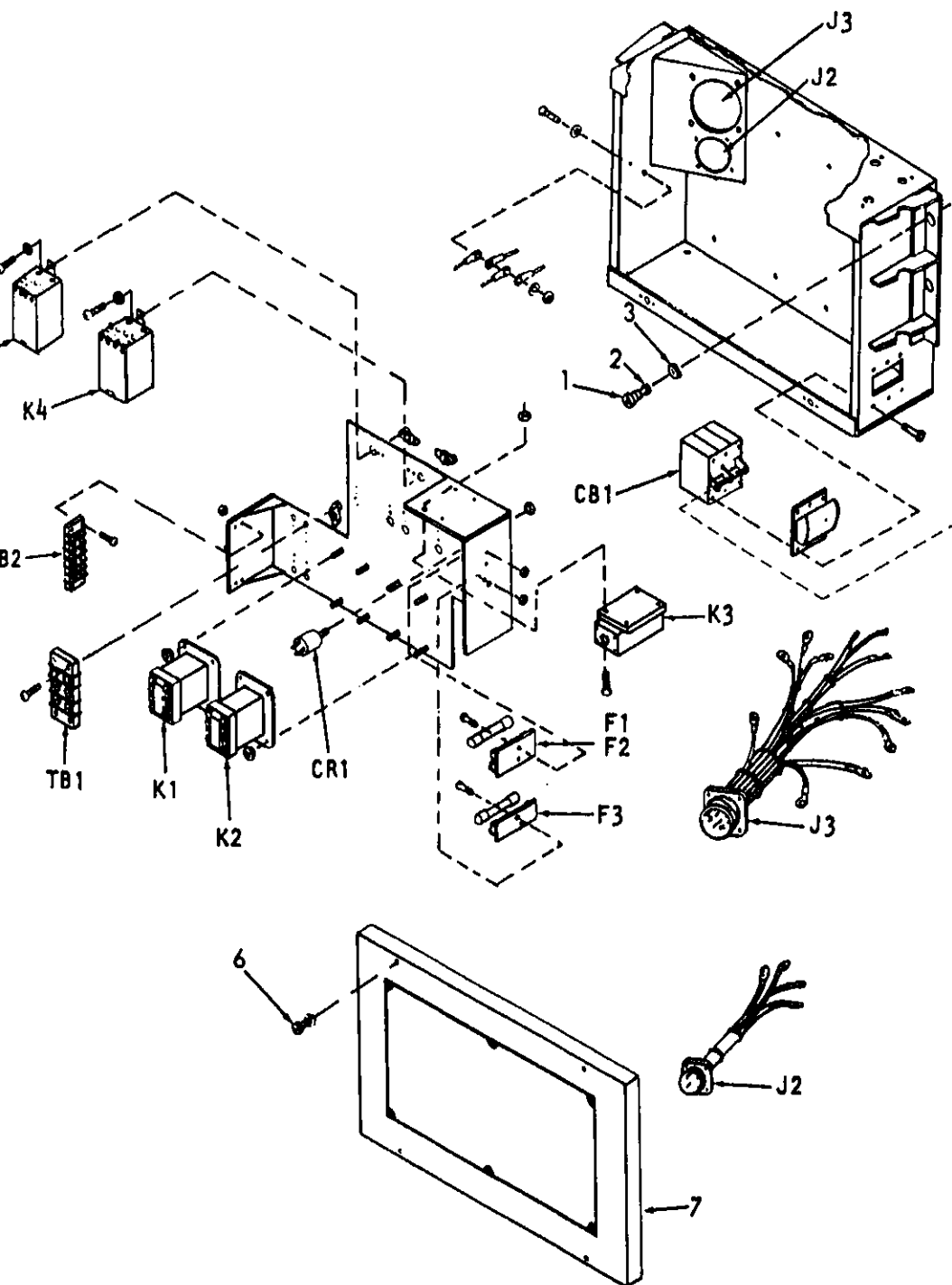


AIR FILTER

RETAINER AIR FILTER



LOWER PANEL



Do not bend tube or bulb located behind panel and air filter.

- (2) Pull junction box forward and disconnect (if required).
- (3) Loosen turn-button fasteners that attach the top of the junction box (if required).
- (4) Remove nut (4) on circuit breaker rod.
- (5) Remove junction box (if required).
- (6) Loosen turn-button fasteners (6), and

c. Inspection and Repair.

Junction Box

- (1) Inspect all components and wiring security of attachment.
- (2) Tighten any loose component or wiring.

Fuses, F1, F2 and F3

- (1) Inspect fuses F1, F2 and F3 for damage.
- (2) Test and replace fuses (para 4-29).

Circuit Breaker, CB1

- (1) Inspect circuit breaker and reset.
- (2) Test and replace circuit breaker if defective.

Heater and Motor Relays, K1, K2, K4, and K5

- (1) Inspect relays for damage.
- (2) Test and replace relays (para 4-3) if defective.

Time Delay Relay, K3

- 2) Test and replace transformer (para 4-35) if it is defective.

1 Boards, TB1 and TB2

Refer to paragraph 4-36 and inspect and replace terminal boards as required.

cles J3 and J2

Refer to paragraph 4-37 and inspect and replace electrical connectors as required.

ers CR1 and CR2

- 1) Inspect rectifiers for damage.
- 2) Test and replace rectifiers (para 4-38) if they are defective.

lation.

n Box

- 1) Align holes in junction box cover (7) with holes in junction box.
- 2) Secure junction box cover (7) by tightening turn-buckle fasteners (6).
- 3) Connect electrical connector P3 and P2.
- 4) Reinstall rod (5) using nut (4).

CAUTION

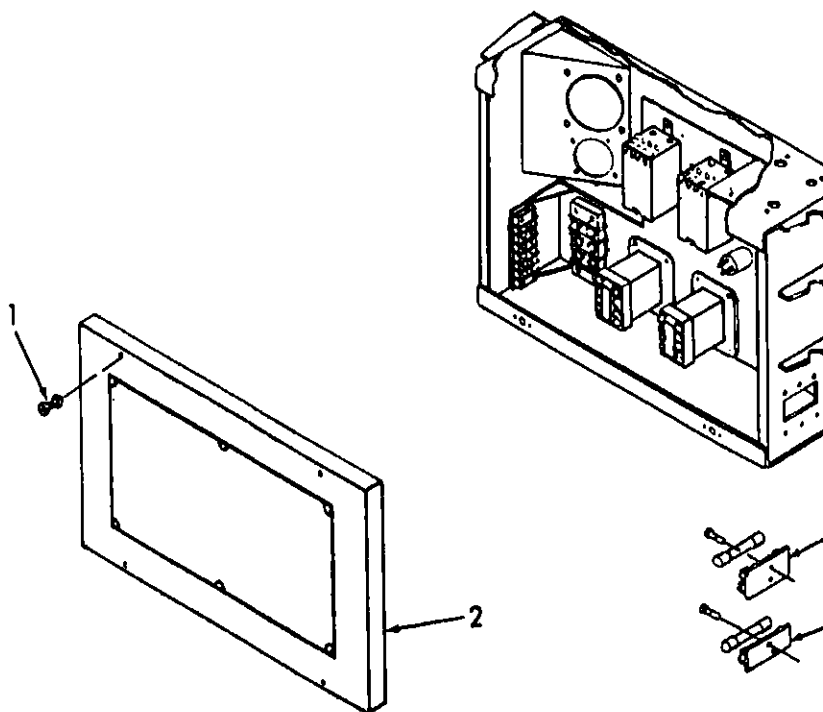
Do not bend tube on rear of control panel.

- 5) Align holes in junction box with holes in housing.
- 6) Secure junction box with screws (1), washers (2), lockwashers (3).
- 7) Install lower panel (para 4-12).

4-29 FUSE REPLACEMENT.

a. Preliminary Procedure.

- (1) General Procedure (para 4-28).
- (2) Remove lower panel (para 4-12).



b. Removal.

Junction Box

Loosen turn-button fasteners (1) and remove cover (2).

Fuses

Remove fuses F1, F2, or F3.

c. Test.

Test fuses for continuity. Replace defective fuses.

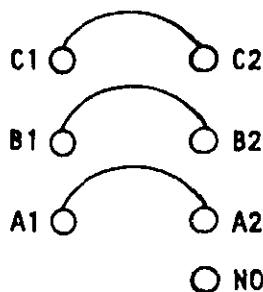
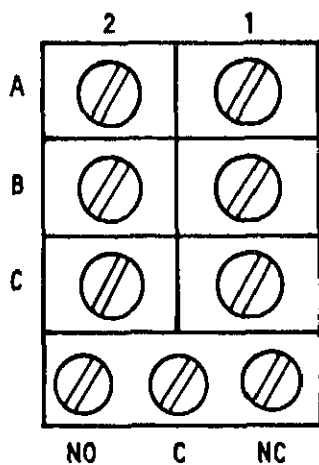
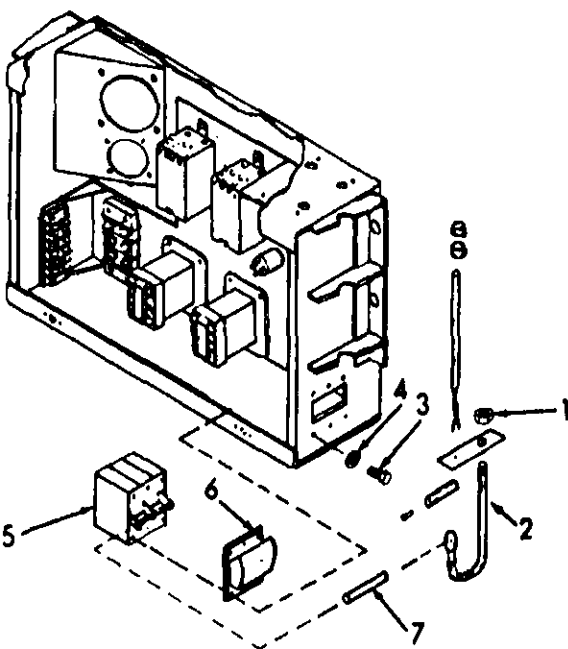
F1	10A	AC Voltage to
F2	10A	Control Circuits
F3	5A	DC Voltage

- (2) Align holes in junction box cover (2) with holes junction box.
- (3) Secure junction box cover (2) by tightening turn-fasteners (1).
- (4) Install lower panel (para 4-12).

CIRCUIT BREAKER.

liminary Procedures.

Remove junction box (para 4-28).



- (3) Remove screws (3) and washers (4) that secure circuit breaker (5) to junction box.
- (4) Remove circuit breaker.
- (5) Remove circuit breaker cover (6).
- (6) Remove connecting pin (7) from circuit breaker.

c. Testing.

CONTINUITY CHECK

- (1) Place the circuit breaker in the ON position.
- (2) Using a multimeter, test for continuity between the following terminals:
 - C1 and C2
 - B1 and B2
 - A1 and A2
 - C and NO

- (3) Replace circuit breaker if there is no continuity.

SHORT CIRCUIT TEST

- (1) Place the circuit breaker in the OFF position.
- (2) Using a multimeter, test for a short circuit between the following terminals:
 - C1 and C2
 - B1 and B2
 - A1 and A2
 - C and NO

- (3) Replace circuit breaker if there is a short circuit.

d. Installation.

- (1) Install connecting pin (7) on circuit breaker. Tighten circuit breaker rod (2).
- (2) Reinstall wires and remove tags.
- (3) Align holes in circuit breaker (5) with holes in circuit breaker cover (6) and junction box.

- (5) Install circuit breaker rod (2) and nut (1).
- (6) Install junction box (para 4-28).
- (7) Install lower panel (para 4-12).
- HEATER RELAY (K2).

Description

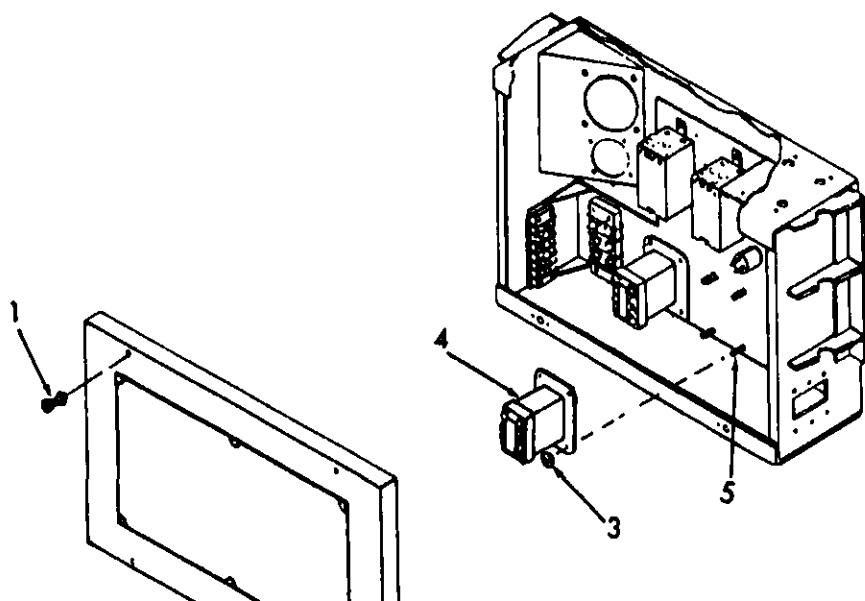
Heater relay (K2) closes to supply power to the electric heater as called for by the HI-HEAT or LO-HEAT setting of the thermostat switch (S1).

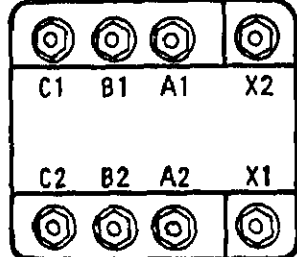
WARNING

Be careful when working with high voltage. Failure to comply can result in serious injury or death.

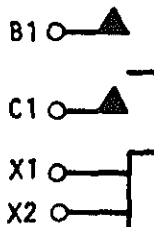
Removal Requirements.

- (1) Remove lower panel (para 4-12)
- (2) Remove junction box (para 4-28).





TERMINAL LOCATION



SCHEMATIC

DE-ENERGIZED
CHECK FOR
CIRCUIT
BETWEEN

A1 AND A2
B1 AND B2
C1 AND C2

TABLE A

DE-ENERGIZED
CHECK FOR
CONTINUITY
BETWEEN

X1 AND X2

TABLE B

c. Removal

- (1) Loosen turn-button fasteners (1), and (2).
- (2) Tag and remove all wires from relay.
- (3) Remove nuts (3) that secure relay (4)

d. Testing

- (1) With relay de-energized, check for short terminals shown in Table A. If any short found, replace relay.
- (2) With relay de-energized, check for continuity terminals shown in Table B. If any open found, replace relay.
- (3) Energize relay coil between terminals

- (5) De-energize relay.
- (6) Replace relay if defective.

Installation.

- (1) Align holes in relay (4) with studs (5) in junction box.
- (2) Secure relay with nuts (3).
- (3) Install wires and remove tags.
- (4) Install front panel (2) and secure with turn-bushings (1).
- (5) Install lower panel (para 4-12).

COMPRESSOR MOTOR RELAY (K1).

Description.

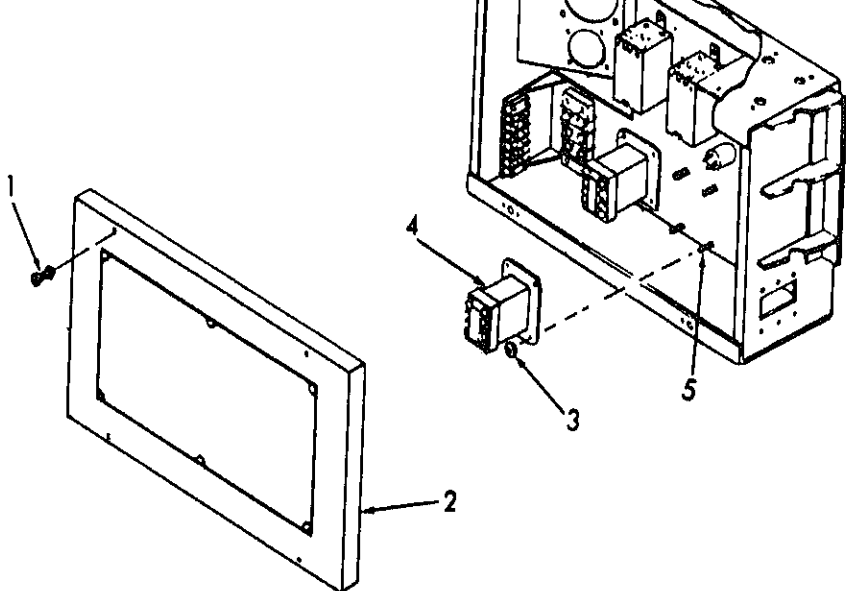
The compressor start relay operates in conjunction with relay (K3) and the high- and low-pressure cutout switch (S5) to insure proper starting sequence of the refrigerant compressor when either S6 or S7 require non-operation.

WARNING

Be careful when working with high voltage. Failure to comply can result in serious injury or death.

Eliminatory Requirements.

- (1) Remove lower panel (para 4-12).
- (2) Remove junction box (para 4-28).



DE-ENERGIZED
CHECK FOR
CIRCUIT
BETWEEN
A1 AND A2
B1 AND B2
C1 AND C2
TABLE A

DE-ENERGIZED
CHECK FOR
CONTINUITY
BETWEEN
X1 AND X2
TABLE B

c. Removal.

- (1) Twist turnbutton fasteners (1) and remove front panel (2).
- (2) Tag and remove all wires from relay.
- (3) Remove nuts (3) that secure relay (4) from chassis (5).

d. Testing

- (1) With relay de-energized, check for short circuit between terminals X1 and X2.

With relay energized, check for continuity between terminals shown in Table C. If any open circuit is found, replace relay.

De-energize relay.

tion

Align holes in relay (4) with studs (5) in junction

Secure relay with nuts (3).

Install wires and remove tags.

Install front panel (2) and secure with turn-button fasteners (1).

Install lower panel (para 4-12).

DELAY RELAY (K3).

on.

The delay relay is employed in the start circuit to delay the refrigerant compressor for approximately 30 seconds after the selector switch (S1) has been placed in the COOL position. This allows the fan motor to start and come up to operating speed before the compressor starts, preventing a power overload.

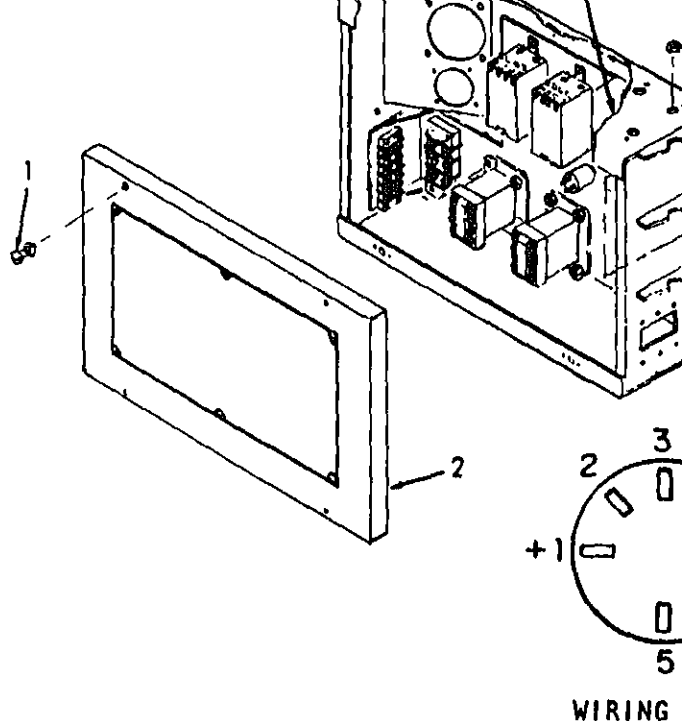
WARNING

Be very careful when working with high voltage. Failure to follow these instructions can result in serious injury or death.

Requirements.

Remove lower panel (para 4-12).

Remove junction box (para 4-28).



c. Removal.

Cover

- (1) Twist Turn-button fasteners (1) and (2).

d. Testing.

- (1) Tag and disconnect wire V14B16 from wire V12B16 from TB2 terminal 2, and relay K1 terminal X1.
- (2) Check for short circuit between wires. Replace relay K3 if any short circuit is found.
- (3) Reconnect wires disconnected in step (1) to their original terminals.

e. Removal.

Relay K3

- (1) Tag and remove all wires from relay K3.

ation

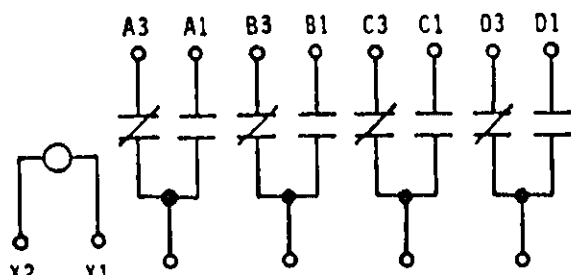
- 1) Align holes in relay (5) with holes in bracket (6).
 - 2) Install relay using screws (4) and nuts (3).
 - 3) Install wires and remove tags.
 - 4) Install front panel (2) and secure with turn-button fastener (1).
 - 5) Install lower panel (para 4-12).
- AY ARMATURE (K4 & K5).

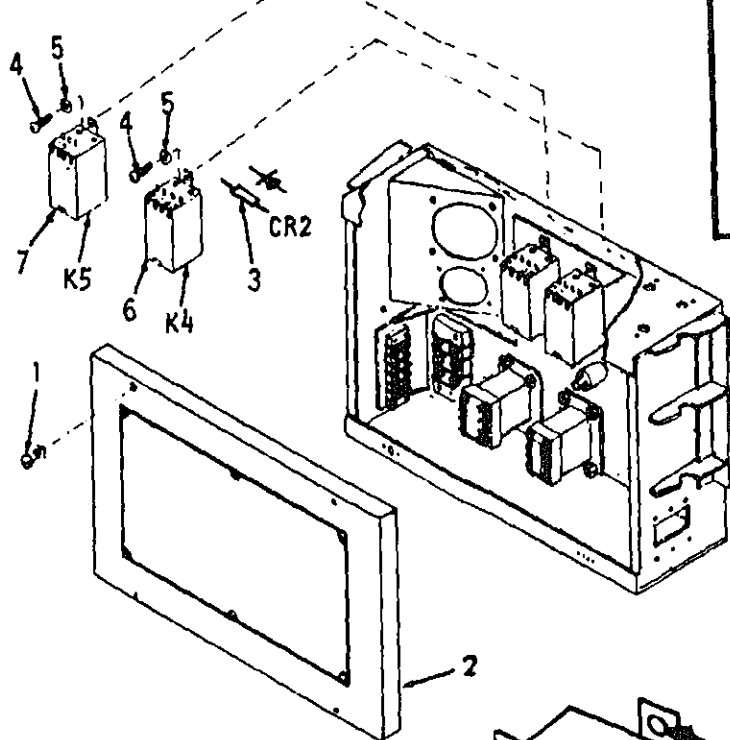
otion.

Armature relays (K4 and K5) control electrical power to the fan motor. The fan speed is controlled by the positioning of the two-speed fan switch. When the fan switch is in the LO-SPEED position, an increase in discharge pressure to 400 (+16) psig will close the pressure switch (S3) and cause the armature relay (K4) to close, placing the fan motor in HI-SPEED. When the discharge pressure drops to 350 (+16) psig, the pressure switch (S3) will open, causing relay (K4) to open and the fan speed will return to LO-SPEED.

Primary Requirements.

- 1) Remove lower panel (para 4-12).
- 2) Remove junction box (para 4-28).





○ X2	X1		
D1	C1	B1	A
○	○	○	○
D3	C3	B3	A
○	○	○	○
D2	C2	B2	A

SLIDE
CASE
DOWN



PULL TAB TO
RELEASE CASE

MOUNT
HOLES

DE-ENERGIZED
CHECK FOR
CONTINUITY

X1 AND X2
A2 AND A3
B2 AND B4
C2 AND C5
D2 AND D6

DE-ENERGIZED
CHECK FOR
SHORT CIRCUIT

A1 AND A2
B1 AND B2
C1 AND C2
D1 AND D2
Y1 AND CASE

ENERGIZED
CHECK FOR
CONTINUITY

A1 AND A2
B1 AND B2
C1 AND C2
D1 AND D2

SH

A2
B2
C2
D2

- Tag and remove all wires from relay K4 or K5.
- With relay de-energized, check for continuity between terminals shown in Table A. Replace relay if any circuit is found.
- With relay de-energized, check for short circuit between terminals shown in Table B. Replace relay if any circuit is found.
- Energize relay coil between terminals X1 and X2 with 28 ± 1 volt DC.
- With relay energized, check for continuity between terminals shown in Table C. Replace relay if any circuit is found.
- With relay energized, check for short circuit between terminals shown in Table D. Replace relay if any circuit is found.
- De-energize relay.

y (K4 or K5)

- Tag and remove all wires from relay.
- Relay K4 - Remove diode CR2 (3).
- Remove screws (4), and washers (5).
- Remove relays (6 or 7).

- ation.
- Align holes in relay (6 or 7) with holes in junction box.
- Install screws (4) and washers (5).
- Install diode (3) on relay K4. Refer to figure for orientation.
- Install wires and remove tags.

(6) Install lower panel (para 4-12).

4-35. TRANSFORMER (T1).

a. Description.

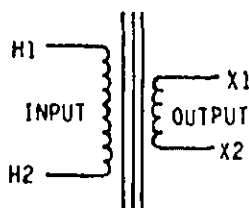
The transformer reduces the 208 vac input elect (+3%) vac required by the rectifier. It is mounted external panel of the junction box, adjacent to the

b. Preliminary Requirements

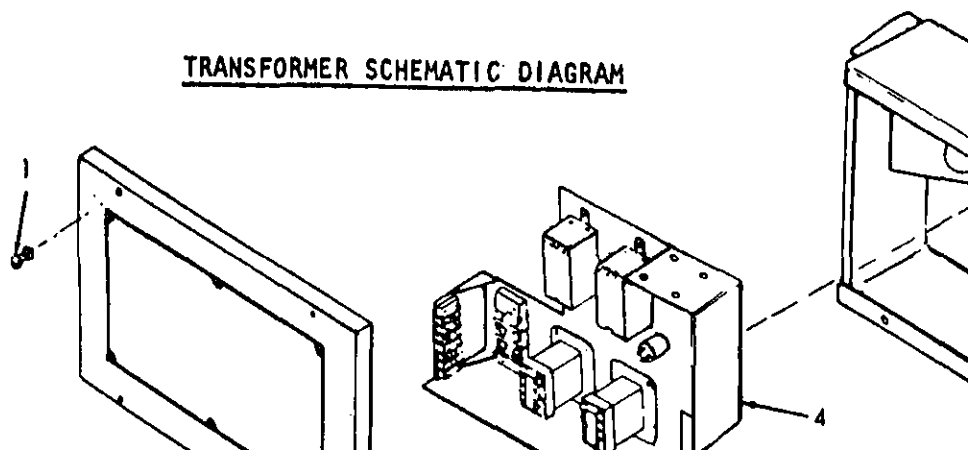
- (1) Remove lower panel (para 4-12).
- (2) Remove junction box (para 4-28).

WARNING

Be careful when working with high voltage. to comply can result in serious injury or



TRANSFORMER SCHEMATIC DIAGRAM



(2).

Panel

- (1) Remove screws (3) that attach panel (4) to junction
- (2) Carefully pull the panel out of the junction box so access to the transformer base is obtained.

Transformer

- (1) Remove nuts (5).
- (2) Raise transformer (6) to gain access to wiring.
- (3) Tag and remove wires.
- (4) Remove transformer (6) and gasket (7).

Testing

- (1) Check for continuity between terminals H1 and H2. Replace transformer if any open circuit is found.
- (2) Check for continuity between terminals X1 and X2. Replace transformer if an open circuit is found.
- (3) Check for short circuit between terminals H1 and X1. Replace transformer if a short circuit is found.
- (4) Check for short circuit between terminals H1 and the transformer case. Replace transformer if a short circuit is found.
- (5) Check for short circuit between terminals X1 and the transformer case. Replace transformer if a short circuit is found.

Reassembly

- (1) Place gasket (7) on transformer (6).
- (2) Install wires and remove tags.
- (3) Place transformer and gasket on junction box.
- (4) Install nuts (5).
- (5) Carefully install the panel into the junction box.

(7) Install front panel (2) and secure with fasteners (1).

(8) Install junction box (para 4-28).

(9) Install lower panel (para 4-12).

4-36. TERMINAL BOARDS (TB1 & TB2).

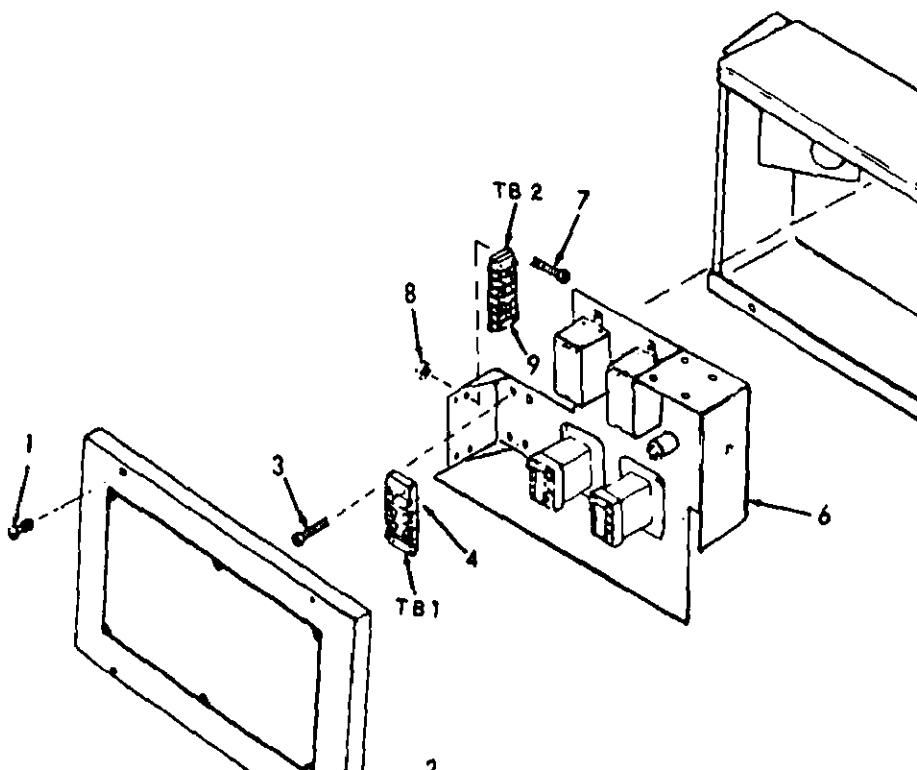
a. Description.

There are two terminal boards mounted in the 1 of the junction box. Electrical power is distributed terminal boards to all electrical components of the All terminal boards are removed and installed in a

b. Preliminary Requirements.

(1) Remove Lower panel (para 4-12).

(2) Remove junction box (para 4-28) (for only).



(2).

Tag and remove wires.

Remove screws (3).

Remove terminal board (4).

Tag and remove wires.

Remove screws (5) that attach panel (6) to junction box.

Carefully pull the panel out of the junction box so that access to TB-2 mounting nuts is obtained.

Remove nuts (8) and screws (7).

Remove terminal board (9).

n.

terminal boards for cracks, breaks, and damaged

ion.

Align terminal board (4) with holes in junction box.

Install screws (3).

Install wires and remove tags.

Align terminal board (9) with holes in junction box.

Install screws (7) and nuts (8).

Install wires and remove tags.

Carefully install the panel into the junction box.

4-37. RECEPTACLES.

a. Preliminary Requirements.

- (1) Remove lower panel (para 4-12).
- (2) Remove junction box (para 4-28).

b. Inspection.

- (1) Inspect for deformation, damaged threads or broken wafers.
- (2) Check continuity from each pin of the terminal end of its associated wire lead should exist.
- (3) Check continuity from each pin to the connector. Continuity should not exist.
- (4) Replace the receptacles if they indicate continuity requirements are not met.

c. Replacement.

- (1) Replacement is easily accomplished as per harness repair, refer to para 4-45.

4-38. RECTIFIER ASSEMBLY (CR1).

a. Description.

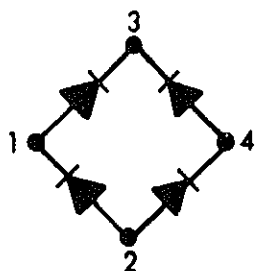
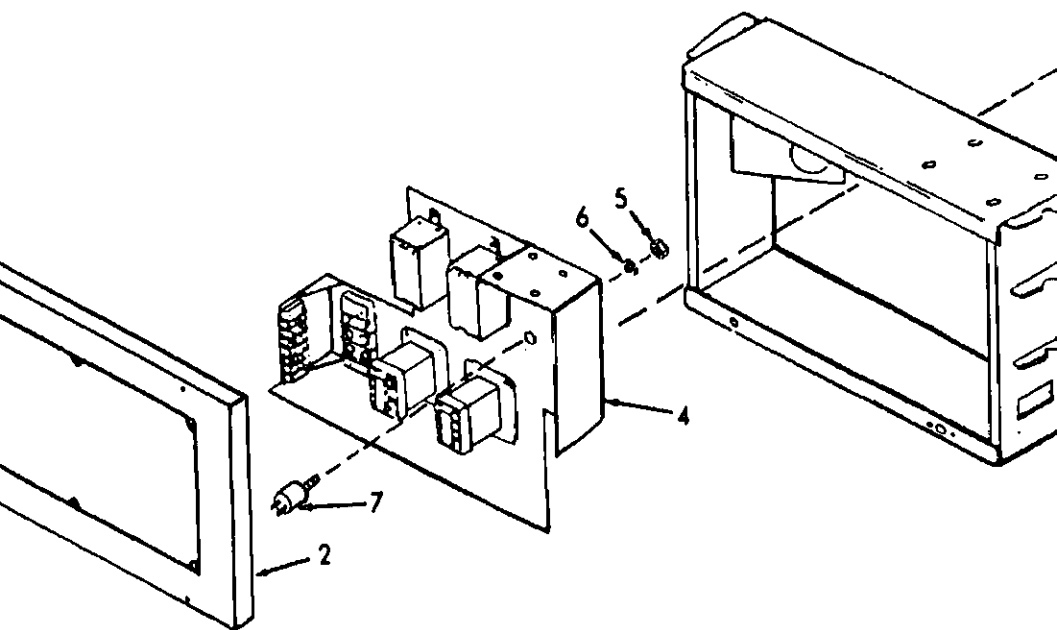
The rectifier is located on the center right side box. It changes 30-volt alternating current to 30-volt direct current for operation of the armature relays, compressor start delay relay and solenoid valves.

b. Preliminary Requirements.

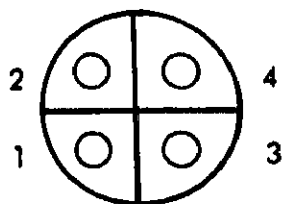
- (1) Remove lower panel (para 4-12).
- (2) Remove junction box (para 4-28).

WARNING

Be careful when working with high voltage. Contact with high voltage can result in serious injury or death.



SCHEMATIC



RECTIFIER
WIRING VIEW

val.

Cover

(1) Tag and remove all wires from rectifier.

(2) Using a multimeter test for continuity and

Low Resistance

High Resistance

1 to 3

3 to 1

4 to 3

3 to 4

2 to 1

1 to 2

2 to 4

4 to 2

(3) Replace rectifier if found defective.

e. Removal.

CR1

(1) Remove screws (3) that attach panel (4) to junction box.

(2) Carefully pull the panel out of the junction box. Access to the back of the panel is obtained.

(3) Remove nut (5) and washer (6).

(4) Remove rectifier (7).

f. Installation.

(1) Insert rectifier (7) in panel (4).

(2) Install washer (6) and nut (5).

(3) Carefully insert panel (4) into junction box.

(4) Secure panel (4) with screws (3).

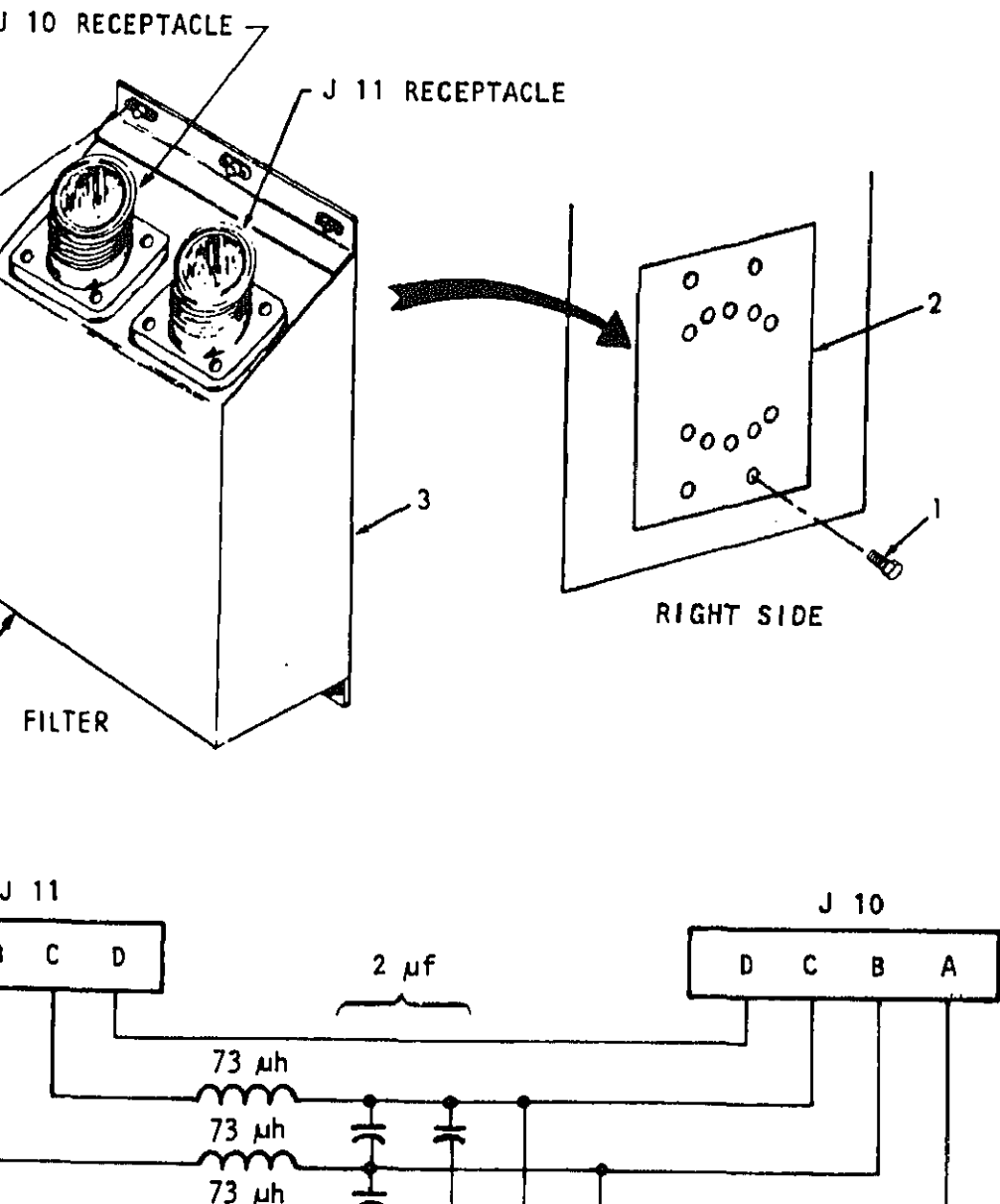
(5) Install front panel (2) and secure with top fasteners(1).

(6) Install junction box (para 4-28).

(7) Install lower panel (para 4-12).

tion.

sion of radio frequency interference (RFI) is attained by providing a low-resistance path to ground for stray currents. This is accomplished by including shielding the ignition and high-frequency wiring to the frame with bonding straps, and using capacitors and inductors. The air conditioner's RFI filter consists of a 73 μH inductor in series with each phase, and capacitors between phases and between each phase and ground.



b. Removal.

- (1) Remove screws (1) from the filter m
- (2) Pull the filter housing (3) and mou
outward as far as possible, and dis
plugs, P10 and P11, from receptacle
filter housing.
- (3) Remove screws (4) near the top and
mounting plate to release the filte
Separate the housing from the mount

c. Inspection.

- (1) Inspect the housing and mounting pl
damage such as dents, punctures or
- (2) Look for evidence of overheating, o
potting compound, arcing at termina
- (3) Check continuity between connector
the following table.

From receptacle J10, pin	To receptacle J11, pin
A	A
A	B
A	C
A	D
B	B
B	C
B	D
C	C
C	D
D	D

good, and replace the defective RFI Filter Assembly.

Installation

- (1) Position the filter housing (3) on the mounting (2) using screws (4).
- (2) Install connectors P10 and P11.
- (3) Install mounting plate (2) using screws (1).

COMPRESSOR

A refrigeration compressor is a self-contained unit which contains a reciprocating compressor, a drive motor and a crankcase heater. The compressor is hermetically sealed into a dome-shaped steel housing. A type crankcase heater is mounted around the outside of the compressor housing near the base. Organizational Maintenance is responsible for testing of compressor and testing and replacing crankcase heater.

COMPRESSOR TEST

WARNING

Disconnect power from the air conditioner before performing maintenance on the electrical system. The voltage used can be lethal.

Prerequisite Requirements

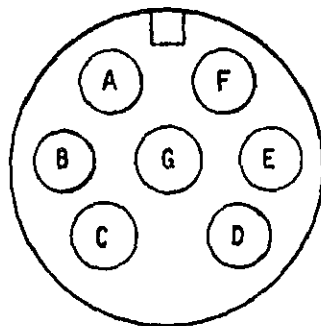
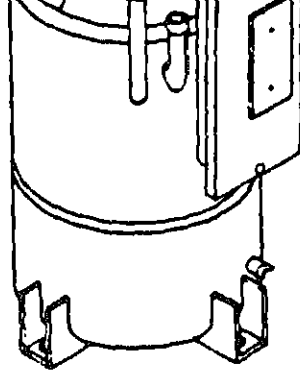
Remove junction box (para 4-28).

Special Tools.

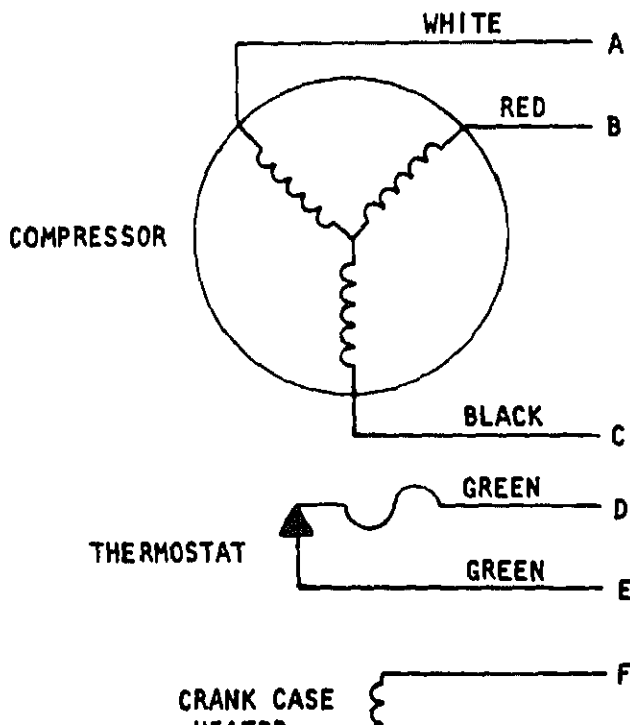
Timing

Valve

To gain access to the compressor the harnesses to the junction box may be removed.



PIN SIDE
J 4



- 2) If mounting bolts are loose, tighten them. If electrical trouble is indicated, check continuity follows:
- 3) Disconnect plug, P4, from the electrical junction on the compressor.
- 4) Using a multimeter check for continuity on recept J4.

Compressor Motor

A to B
B to C
A to C

Thermal Overload

D to E

Crankcase Heater

F to G

- 5) Using a multimeter check for a lack of continuity between receptacle J4 and compressor housing. A, D, and housing.
- 6) If there is no continuity between F and G, replace crankcase heater.
- 7) If the continuity requirements are not met for A, and C or D and E, refer to Direct Support Maintenance.

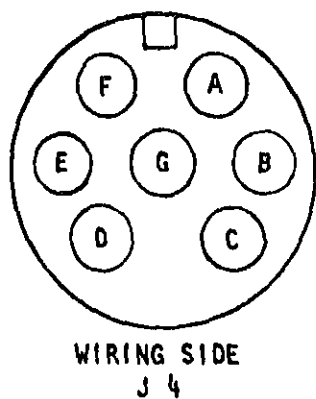
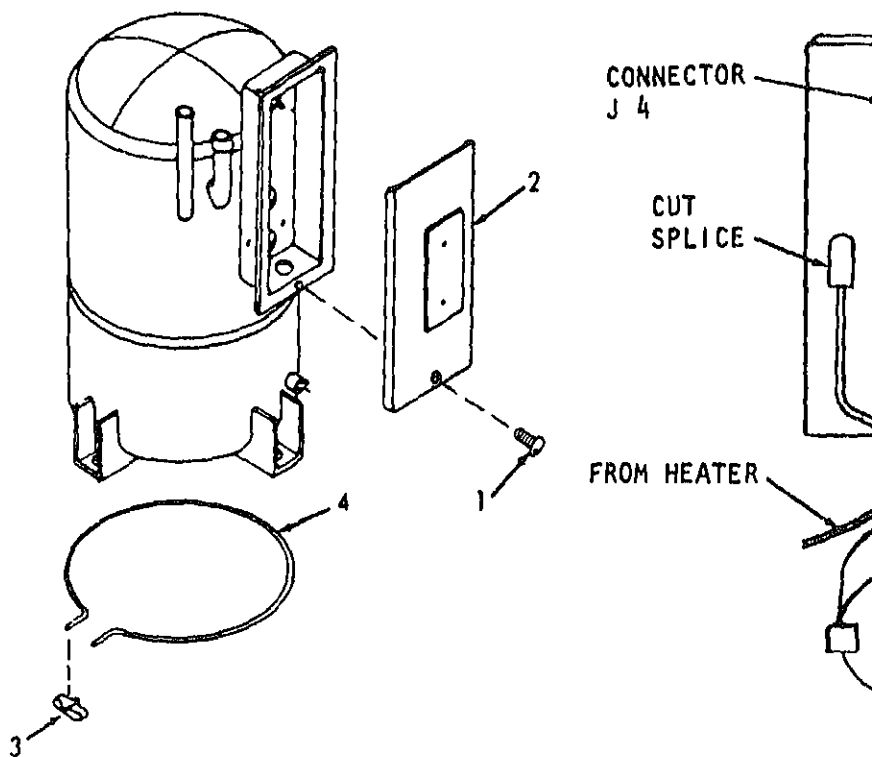
air is limited to crankcase heater only (para 4-40.2).

CRANKCASE HEATER.

ption.

Resistance type crankcase heater is mounted around the compressor housing near the base. The purpose of the crankcase heater is to prevent migration of liquid refrigerant into the oil in cold weather. Liquid refrigerant could mix with the oil to be pumped throughout the system.

(2) Remove junction box (para 4-28).



c. Removal.

- (1) Remove screw (1) then compressor j
- (2).

it.

tion or Test.

- 1) Inspect heating element for damage.
- 2) Test heating element as per para 4-40.2.

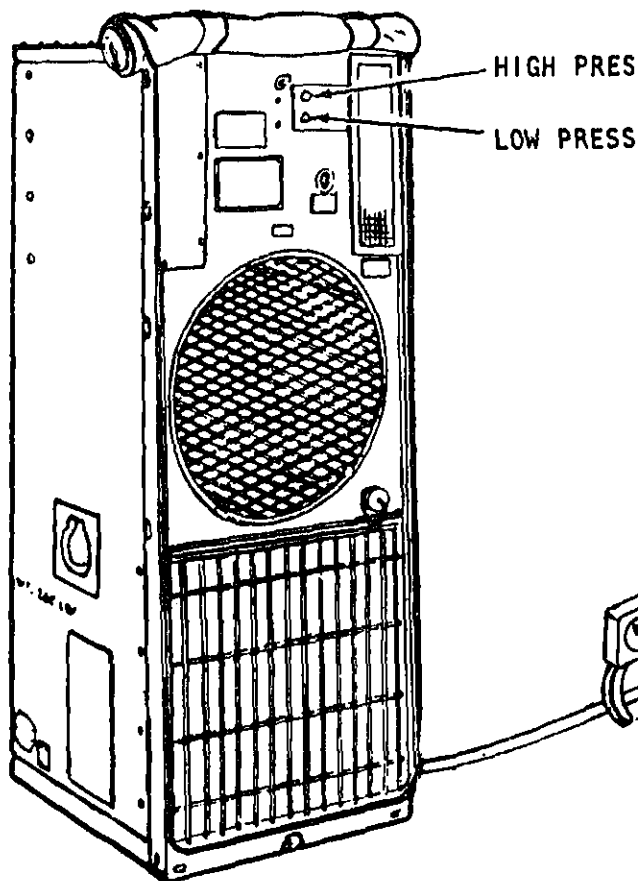
lation.

- 1) Maneuver the crankcase heating element (4) over top of the compressor, and down to the lower part of compressor housing. Do not spread the ends of the heating element any more than necessary. Install retaining spring (3) over both ends of the heating element (4) to hold it in position.
- 2) Lead electrical wires from heating element (4) in compressor junction box. Slide a one-inch length heat-shrink tubing over one wire lead, and solder to pin G of receptacle with solder (item 12, table). Slide heat-shrink tubing over connection, and heat with a match to shrink in place. Splice the other heating element lead to the thermostat lead and insulate as necessary.
- 3) Install cover (2) on junction box using screw (1).
- 4) Install plug P4.
- 5) Install junction box (para 4-28).
- 6) Install lower panel (para 4-12).

SSURE SWITCHES.

Pressure switches are of two types, a high/low pressure switch and a pressure control switch. Organizational Maintenance is limited to testing of the pressure switches, for replacement to Direct Support Maintenance in Chapter 5.

The high-pressure and the low-pressure cutout protective devices which interrupt electrical power whenever refrigerant system pressure becomes too high permit safe, efficient operation. The pressure cutout switches are made by means of capillary tubes to the discharge and suction side of the compressor. Electrically, they are connected in series between the rotary selector switch and the compressor. Both switches are equipped with manual reset. The pressure cutout switches are located next to the fan screen on the back of the air conditioner.



b. Test.

Check electrical operation of the pressure cutout switches in the following manner.

reading should drop when each reset button is pressed and return to its original reading when the button is released.

- (3) If the ammeter does not respond when each button is pressed and released, refer to Direct Support Manual for replacement.

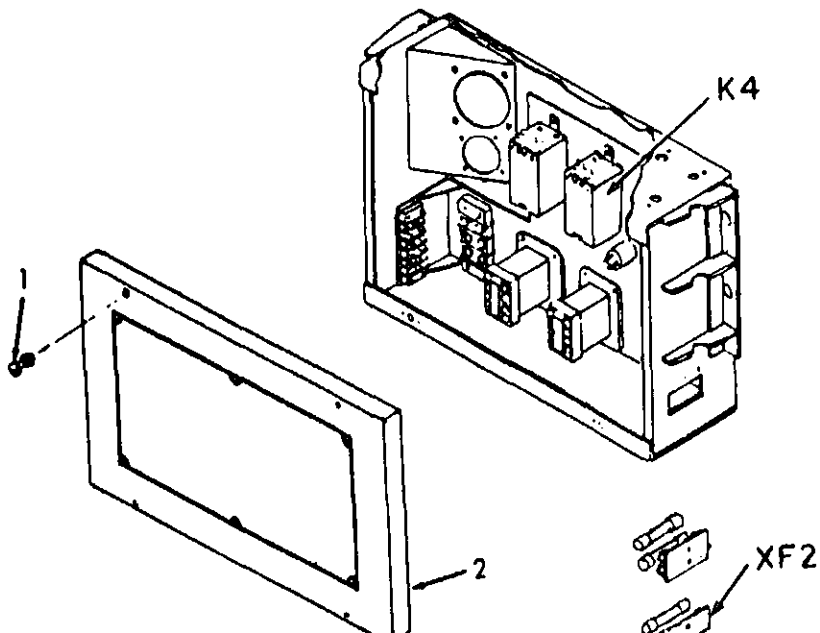
PRESSURE CONTROL SWITCH (FAN SPEED).

Description.

The pressure switch (fan speed) is installed to sense compressor discharge pressure. When the air conditioner is operated with the switch in the LO-SPEED position, an increase in compressor discharge pressure to 400 (+16) psig ($281.2 + 11.2 \text{ kg cm}^2$) will normally open pressure switch (S3), causing the switch to increase the fan speed to HI-SPEED. When the discharge pressure drops to 350 (+16) psig, ($246.1 + 10.5 \text{ kg cm}^2$) the pressure switch (S3) contacts will return to normally open and the fan speed will return to LO-SPEED.

Eliminary Requirements.

Remove lower panel (para 4-12).



Check for continuity between terminals 2 (XF2) and X2 of armature relay (K4). Continuity should not be indicated. If continuity is indicated, switch is defective and must be replaced.

e. Replacement.

Refer to Direct Support Maintenance for pressure switch replacement.

4-42. REFRIGERANT COMPONENTS.

The refrigerant components limited to Organization consist of two solenoid valves that can be tested and coils replaced. Inspection of the sight glass is required. In addition there is servicing of the condenser coil and coil.

4-42.1 LIQUID LINE SOLENOID VALVE L1.

a. Description.

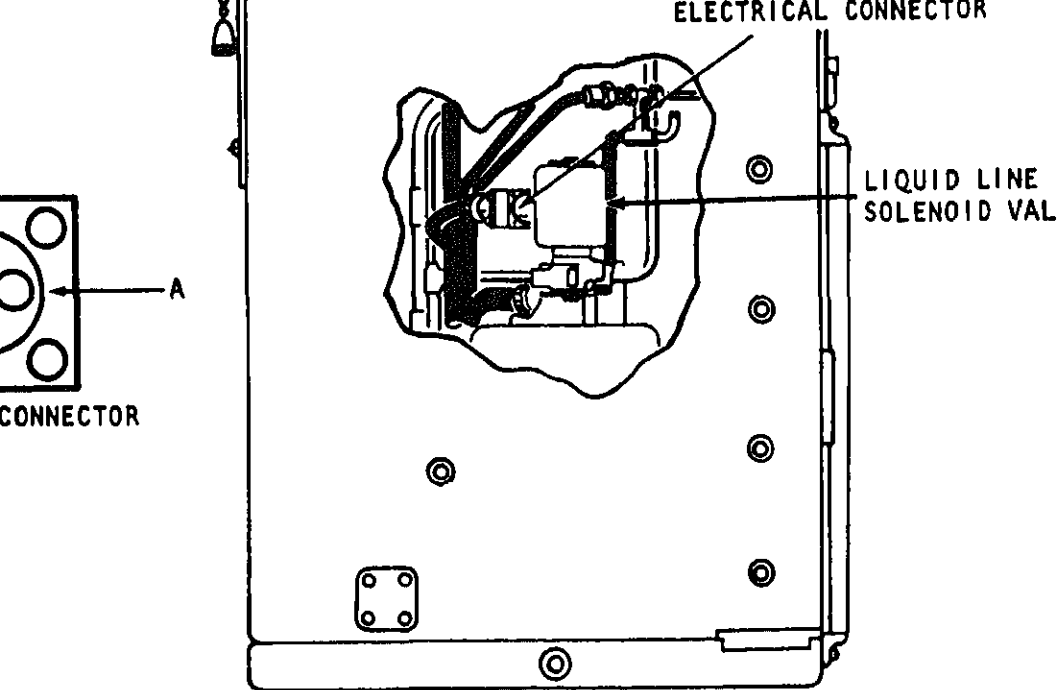
The liquid line solenoid valve is used to close/open refrigerant line from the condenser coil to the evaporator expansion valve. The liquid line solenoid valve is located behind the filter-drier in the lower part of the unit.

NOTE

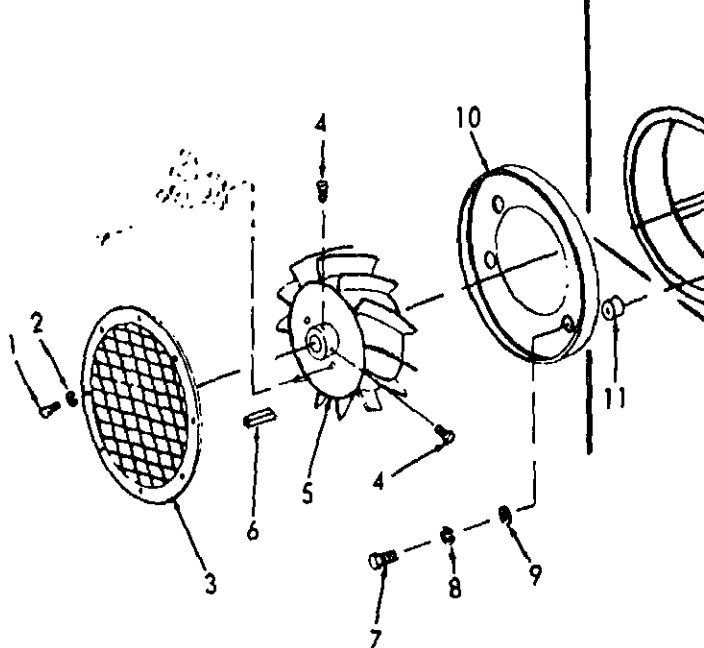
A source of 24 to 28 vdc is required to perform the following test.

b. Preliminary Requirements.

- (1) Removal of lower panel (para 4-12).
- (2) Removal of junction box (para 4-28).

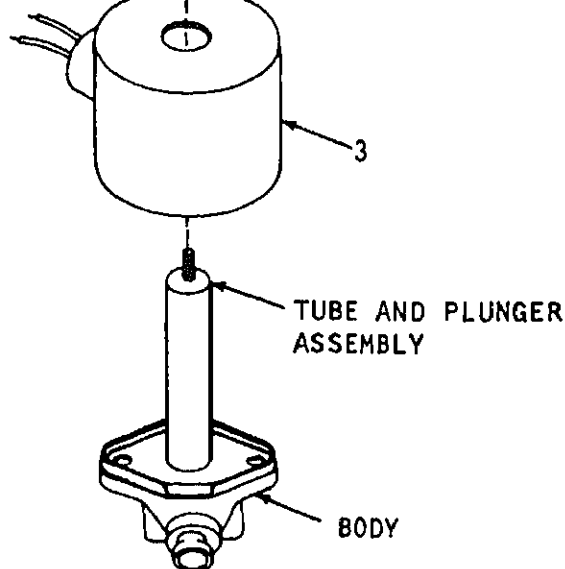


-) Inspect the solenoid valve visually for physical damage, loose connectors, loose coil and housing and broken or frayed wires or missing insulation.
-) Test operation by applying 24-28 volts dc to the pins & B of the electrical connector, and listening for a sharp click which indicates that the solenoid plunger working properly.
-) If damage is evident or solenoid plunger fails to operate, replace the coil assembly. If valve still does not operate properly, as indicated by pressure testing or troubleshooting, refer to Direct Support Maintenance for replacement of the diaphragm or the entire valve.



d. Removal.

- (1) Disconnect wiring harness plug from
- (2) Remove screws (1) and lockwashers (2) from fan guard (3) to housing.
- (3) Remove condenser fan guard.
- (4) Remove set screws (4).
- (5) Using a wheel puller install two 1/2" bolts in evenly.
- (6) Remove condenser fan (5) and key (6).
- (7) Remove screws (7), lockwashers (8), and bushings (9) that attach baffle (10) and bushing (9) to housing.
- (8) The top nut on the solenoid valve is on the left side.



Solenoid Valve Disassembly

Remove nut (1) and data plate (2) from top of coil assembly (3) and lift off coil assembly.

Installation of Coil.

If the electrical connector is serviceable, transfer it to a new coil assembly, and install the coil assembly on the solenoid valve body.

- (1) Place coil assembly (3) over tube and plunger assembly and position data plate (2) on coil assembly. Tighten with nut (1).
- (2) Retest plunger operation by applying 24-28 volts dc to pins A and B of receptacle. If no click is heard, refer to Direct Support Maintenance for replacement of the tube and plunger assembly, diaphragm and O-ring on the valve body.
- (3) If a click is heard when 24-28 volts dc is applied to the solenoid coil, connect the wiring harness to the plug.

- (4) Install baffle (10) and bushings (11) lockwashers (8) and washers (9).

CAUTION

Do not hammer the impeller onto the motor. The motor bearings would be damaged. If difficulty is encountered, dress out rough spots on the impeller with a fine file, stone or abrasive cloth. Apply a coating of light oil to ease assembly.

- (5) Align key ways in shaft and impeller, then press impeller (5) onto shaft. The end of the motor shaft must be even with the face of the hub when the impeller is in position. Tighten setscrews (4) finger tight. Start keyway setscrew, tighten to a final torque of 78-82 in-lb (8.87 - 9.33 newton-meters).

NOTE

In order to direct the condenser exhaust up and away from the intake, the condenser fan guard is designed so that it can be installed in one of two ways. All screw holes must match to permit proper installation.

- (6) Install condenser fan guard (3) with screws and washers (2).

4-42.2 PRESSURE EQUALIZER SOLENOID VALVE.

a. Description.

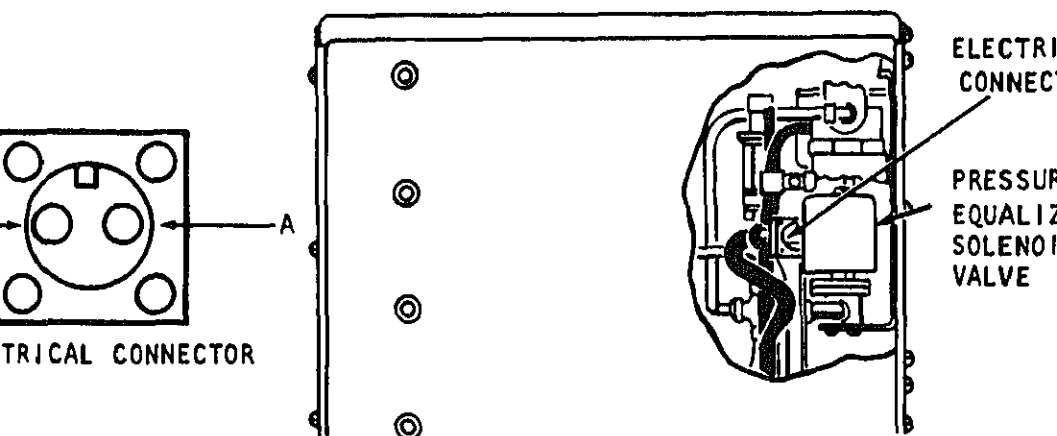
The pressure equalizer solenoid valve is used to provide pressure equalization circuit from the discharge side of the compressor to the suction side. The pressure equalizer valve is located in the upper rear part of the air conditioning unit.

NOTE

A source of 24 to 28 vdc is required to perform the following test.

(2) Removal of top panel (para 4-9).

NOTE: TAG AND DISCONNECT ELECTRICAL LEADS AS NECESSARY.



st.

- (1) Inspect the solenoid valve visually for physical damage, loose connectors, loose coil and housing broken or frayed wires or missing insulation.
- (2) Test operation by applying 24-28 volts dc to the & B of the electrical connector, and listening for sharp click which indicates that the solenoid plunger is working properly.
- (3) If damage is evident or solenoid plunger fails to operate, replace the coil assembly. If valve still does not operate properly, as indicated by pressure testing and troubleshooting, refer to Direct Support Maintenance Manual for replacement of the diaphragm or the entire valve.

- (1) Disconnect wiring harness plug from rear of pressure cut-out.
- (2) Remove screws that attach pressure cut-out to frame.

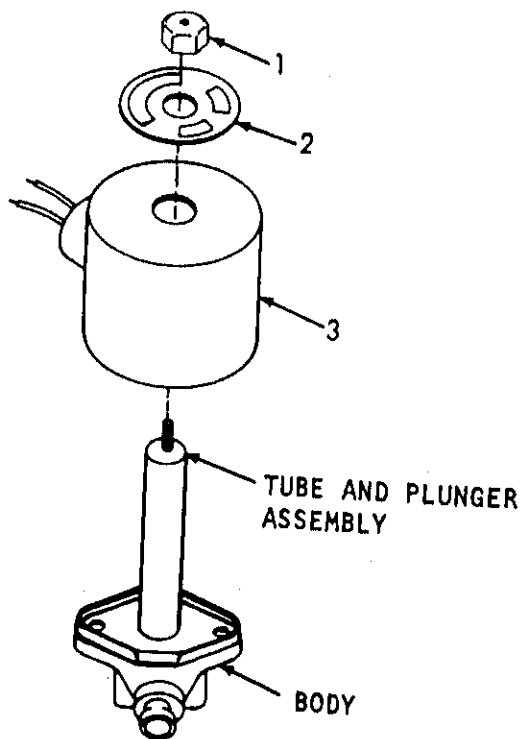
CAUTION

Carefully move pressure cut-out switch box to clear access. Capillary tubes may be damaged.

- (3) Move pressure cut-out switch box.

- (4) Access is now available to top nut of solenoid valve.

e. Solenoid Valve Disassembly



Remove nut (1) and data plate (2) from top of coil assembly (3) and lift off coil assembly.

f. Installation of Coil.

If coil is to be installed...

refer to Direct Support Maintenance for replacement of the tube and plunger assembly, diaphragm and O-ring of the valve body.

- (3) If a click is heard when 24-28 volts dc is applied to the solenoid coil, connect the wiring harness electrical plug.

Final Installation

CAUTION

Carefully move pressure cut-out switch box when reassembling. Capillary tubes may be damaged.

- (1) Relocate pressure cut-out switch box to holes in panel and attach with screws.
- (2) Attach wiring harness plug to solenoid valve.
- (3) Install top panel (para 4-9).
- (4) Install canvas cover (para 4-8).

SIGHT GLASS.

Description.

The sight-glass liquid indicator is a circular sealed window on the liquid side of the system between the liquid line solenoid valve and the evaporator coil expansion valve. The indicator is located on the front surface of the air conditioner, below the pressure cut-out switch.

Inspection.

Visually inspect the sight-glass liquid indicator for physical damage, cracked or broken sight-glass or similar defects.

Replacement.

Refer to Direct Support Maintenance.

The condenser coil assembly consists of two sets of fins: the condenser coil itself, and the suction coil (See Refrigeration Diagram, figure 5-1). The condenser coil is located at the bottom rear section of the air conditioning unit and is covered by a condenser coil guard and screen assembly to protect it from damage and dirt.

b. Preliminary Requirements.

(1) Remove canvas cover (para 4-8).

(2) Remove condenser coil guard (para 4-10).

c. Servicing.

Remove all dust and dirt by using either compressed air or by brushing.

d. Replacement.

(1) Replace the condenser coil guard (para 4-10).

(2) Replace canvas cover (para 4-8).

4-42.5 EVAPORATOR COIL.

a. Description.

The evaporation coil receives liquid refrigerant from the condenser, and evaporates the liquid to a gas by absorbing heat from the air flow passing over the outside surface of the coil. The evaporator coil is located in the top front section of the air conditioning unit.

b. Preliminary Requirements.

(1) Remove canvas cover (para 4-8).

(2) Remove top panel (para 4-9).

(3) Remove air discharge grille (para 4-10).

(4) Remove mist eliminator (para 4-20).

c. Servicing.

Remove all dust and dirt by using either compressed air or by brushing.

3) Replace top panel (para 4-9).

4) Replace canvas cover (para 4-8).

TER.

Maintenance of the heater consists of testing and replacing heater elements and thermostat.

HEATER ELEMENTS.

tion.

Six steel sheathed resistance heating elements are located behind the evaporator coil, and extend all the way across the air conditioner. Three of the elements are energized when the rotary selector switch is set at LO HEAT, and all six are energized when the rotary selector switch is set at HI HEAT. The temperature control thermostat controls only the elements by the LO HEAT setting. All six elements are protected from overheating by a thermal overload protector (heater thermostat).

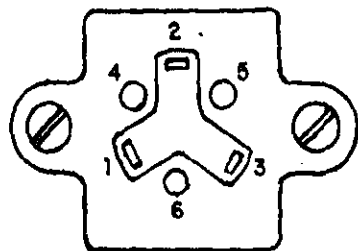
WARNING

Disconnect power from the air conditioner before performing maintenance on the electrical system. The voltage used can be lethal.

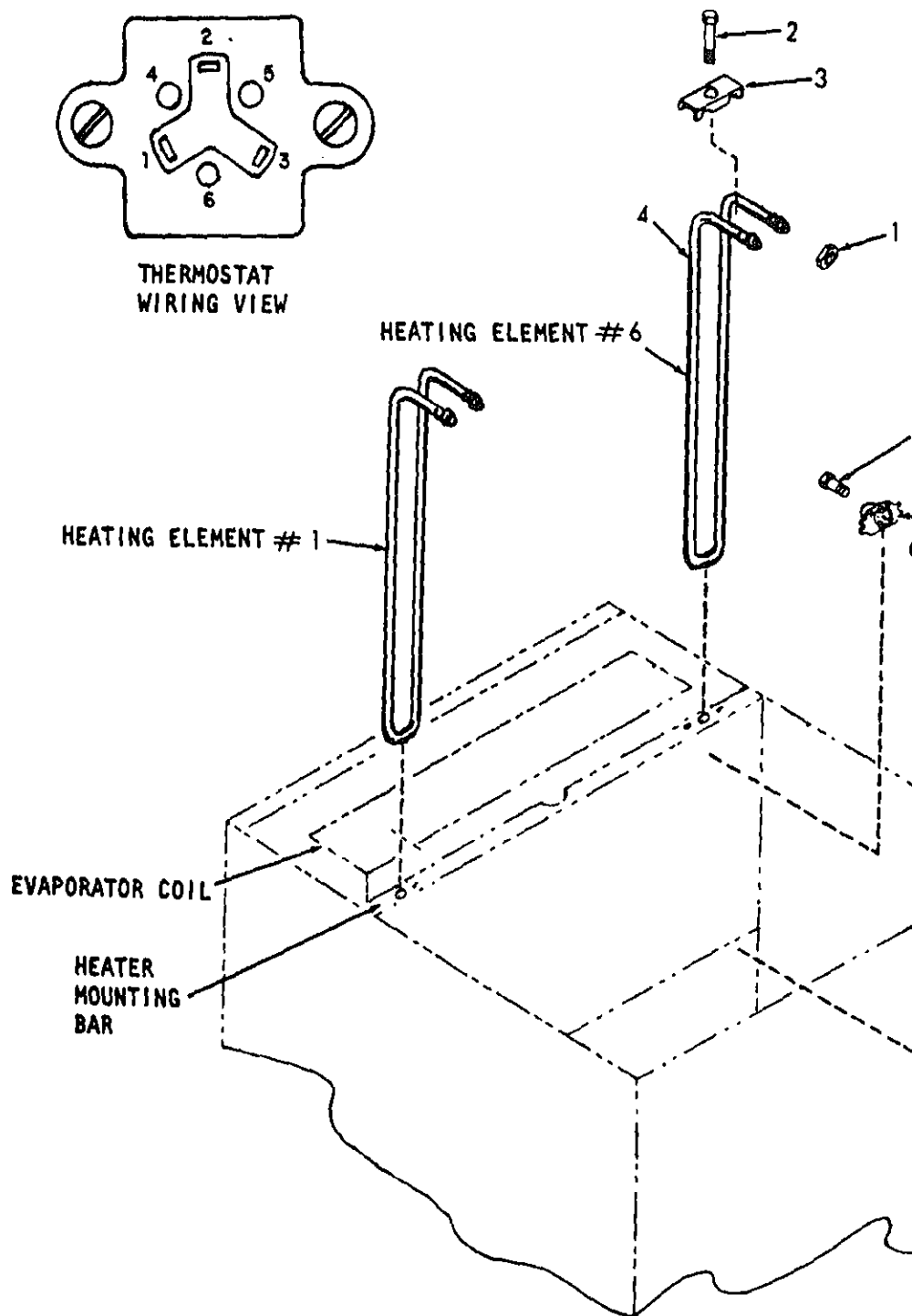
Prerequisite Requirements.

1) Remove canvas cover (para 4-8).

2) Remove top panel (para 4-9).



THERMOSTAT
WIRING VIEW



Continuity testing of each element can be performed at this time if further disassembly is not required.

Unscrew the panel fastener screw (2) in each hold-down clamp (3) and remove the clamp. Pull heating element (4) straight up to remove.

on/Test.

Visually inspect each heating element for damage, deformation, damaged terminal threads, cracked or broken sheath, or burnt-out spots. If damaged, replace.

Using an ohmmeter, multimeter or other continuity tester, check continuity of each heating element. Replace elements that do not indicate continuity.

ly.

Insert each heating element (4) down between the heater mounting bar and the evaporator coil, with each mounting arm equidistant from the panel fastener screw hole.

Place hold-down clamp (3) over both mounting arms, and secure with the panel fastener screw (2).

Make proper wiring connections. (See wiring diagram, figure FU-1).

Replace top panel (para 4-9).

Replace canvas cover (para 4-8).

ER THERMOSTAT.

ion.

Heater thermostat is a thermal overload protector, located between the heating elements. It is electrically connecting elements in such a way that if temperature exceeds a limit, the heater thermostat opens the circuits. When the temperature has returned to normal, the thermostat automatically re-closes the circuits to the heating elements.

The voltage used can be retinal.

b. Special Tool Required.

Multimeter

c. Preliminary Requirements.

- (1) Remove canvas cover (para 4-8).
- (2) Remove top panel (para 4-9).

d. Removal.

NOTE

If desired, heating elements 5 and 6 may be removed for better access for removal of the thermostat attaching hardware.

- (1) Tag and disconnect wire leads from the (4) to the heater thermostat (5).
- (2) Remove two screws (6) and self-locking the heater thermostat (5). Remove the

e. Inspection/Test

- (1) Visually inspect the heater thermostat housing, missing pieces or other damage damaged.
- (2) Using an ohmmeter or other continuity test, check continuity of the wire leads attached to 5-6, and 4-6 of the heater thermostat. If continuity is not indicated, replace heater thermostat.

f. Replacement.

- (1) Place the body of the heater thermostat in the mounting hole of the heater assembly with two screws (6) and self-locking nuts.

NOTE

If two heating elements were removed for continuity test, replace them at this time.

-) Replace top panel (para 4-9).
-) Replace canvas cover (para 4-8).

AND MOTOR.

aporator fan is located on one end of a double-shafted motor. Located on the other end of the motor is a condenser. In the following paragraphs each fan is removed and then the

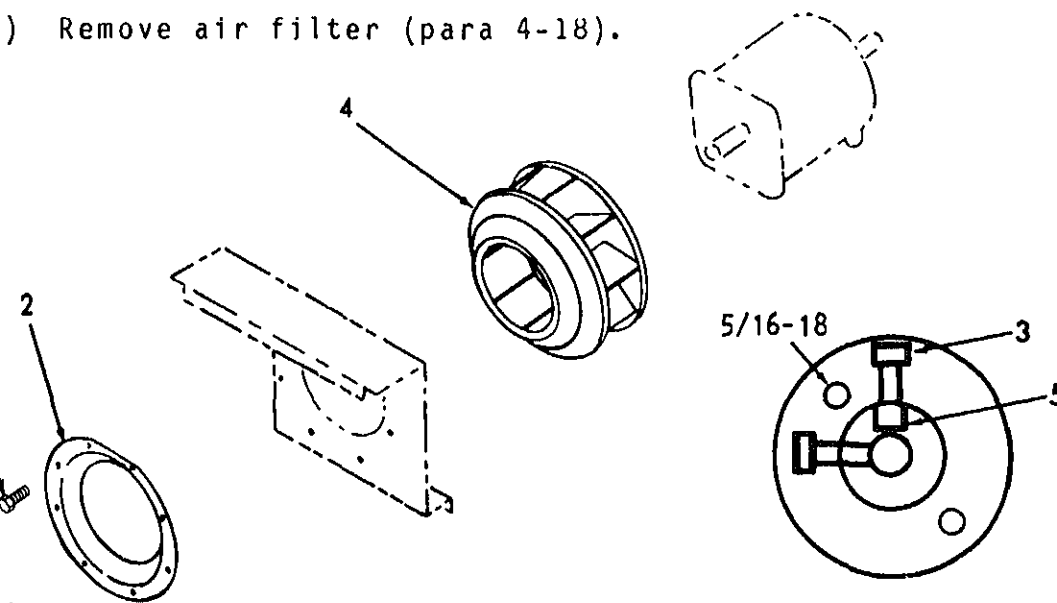
PORATOR FAN.

tion.

aporator fan is located behind the evaporator intake grille and air filter. The fan is driven by a double-shafted two-speed motor. The fan consists of a centrifugal impeller and an inlet ring. The fan is directed upward into the space between the heating elements and evaporator coil, and is discharged through the evaporator grille.

nary Procedures.

-) Remove air intake grille (para 4-11).
-) Remove air filter (para 4-18).



-) Remove screws (1) that attach the inlet ring (2) to the panel.

both in equal increments until impeller

- (4) Remove evaporator fan (4) and key (5)

d. Inspection.

- (1) Inspect the inlet ring for nicks, deformation or evidence of rubbing. Replace if damaged.
- (2) Inspect the impeller for gouges, deformation of rubbing, or broken welds. Replace if damaged.

e. Replacement.

CAUTION

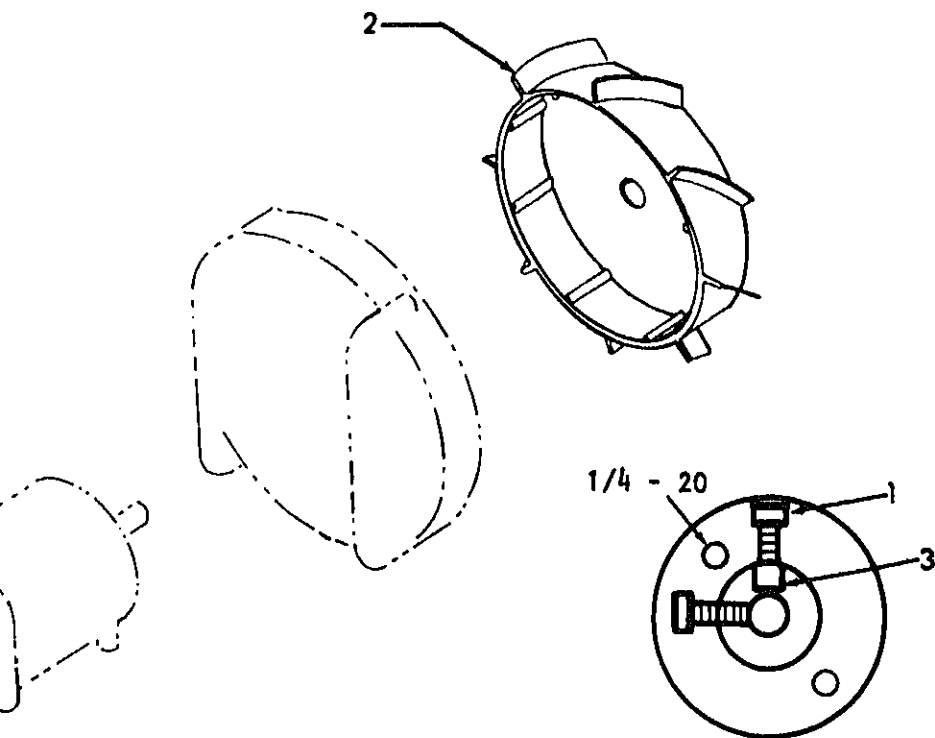
Do not hammer the impeller onto the motor. The motor bearings would be damaged. In difficulty, dress out rough spots on the inlet ring with a fine file, stone or abrasive cloth. Apply a light coating of light oil to ease assembly.

- (1) Place key (5) in the shaft keyway, and slide the impeller (4) on the shaft. The end of the key should be even with the face of the hub.
- (2) Tighten the setscrews (3) over the key. Tighten the setscrews tight, then tighten the remaining setscrews. Tighten both setscrews to a final torque of 8.87 - 9.33 newton meters).
- (3) Position the inlet ring (2) flat edge against the circular fan opening. Secure with setscrews. Rotate the impeller by hand to be sure the inlet ring exists. Adjust inlet ring if necessary.
- (4) Replace the air filter (para 4-18).
- (5) Replace the air intake grille (para 4-18).

Condenser fan is located behind the circular fan guard on the air conditioner. The fan is driven by one end of a belt-driven two-speed motor. It consists of an aluminum axial fan which rotates within a shroud which is part of the motor. Air is drawn into the lower chamber through the condenser fan and is exhausted through the fan guard.

Primary Requirements.

- 1) Remove canvas cover (para 4-8).
- 2) Remove condenser fan guard (para 4-16).



- 3) Loosen two setscrews (1) in the hub of the fan impeller (2) and pull the impeller off the motor shaft.
- 4) Remove key (3).

NOTE

CAUTION

Do not hammer the impeller onto the motor. The motor bearings would be damaged. If is encountered, dress out rough spots on with a fine file, stone or abrasive cloth coating of light oil to ease assembly.

- (1) Align keyways in shaft and impeller, and press impeller (2) onto shaft. The shaft should be even with the face of impeller is completely in position. (1) finger tight. Starting with the tighten to a final torque of 78-82 po 9.33 newton-meters).

NOTE

In order to direct the condenser exhaust away from the intake, the condenser fan g designed so that it can be installed in o way. All screw holes must match to permi installation.

- (2) Replace the condenser fan guard (para
- (3) Replace canvas cover (para 4-8).

4-44.3 FAN MOTOR.

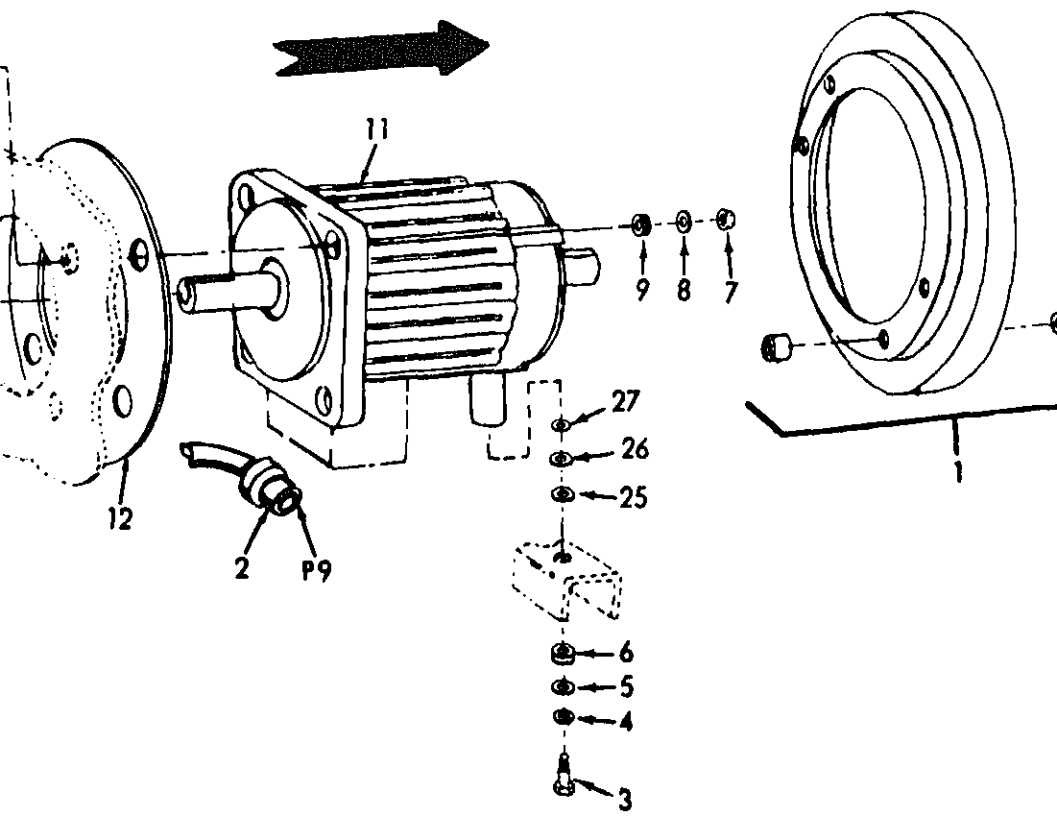
a. Description.

The fan motor is double shafted to drive the e impeller at one end, and the condenser fan impeller. The motor contains two sets of windings, which perm operation. The speed, using one set of windings, i When the second set of windings is switched on, the to 3450 rpm. The motor contains permanently lubric bearings, and is protected against overheating by a protector.

Disconnect power from the air conditioner before performing maintenance work on the electrical system. The voltage used can be lethal.

Preliminary Requirements.

- (1) Remove canvas cover (para 4-8)
- (2) Remove air intake grille (para 4-11).
- (3) Remove air filter (para 4-18).
- (4) Remove condenser fan guard (para 4-16).
- (5) Remove evaporator fan assembly (para 4-44.1).
- (6) Remove condenser fan assembly (para 4-44.2).



- (2) Disconnect wiring harness plug, P9 (1) receptacle, J9, on the motor junction.
- (3) Carefully remove two socket head caps washers (4), flat washers (5), and bushings (6) to secure the motor mounting feet to the motor.
- (4) Remove four self-locking nuts (7), flat washers (8), bushings (9), and flat-head screws (10) from the motor mounting flange (11).
- (5) Carefully withdraw the motor (11) carefully so that the rubber ring (12) is not damaged.

d. Inspection/Test.

- (1) Spin the rotor (13) and listen for bearing noise indicating rough operation. If present, spin the rotor slowly backward and forward by hand to seat the bearings. Replace bearings if roughness is evident.
- (2) Grip the rotor shaft, and attempt to pull the rotor to check for end-play. If there is, shim the rotor or shim(s).
- (3) Using an ohmmeter or other continuity tester, check continuity between connector pins D-F, and between G-H, H-J and G-J. Continuity should be indicated. Also check to be sure that there is continuity exists between each pin and the motor terminal. If continuity requirements are not met, replace the motor.

e. Disassembly.

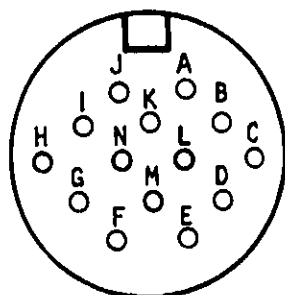
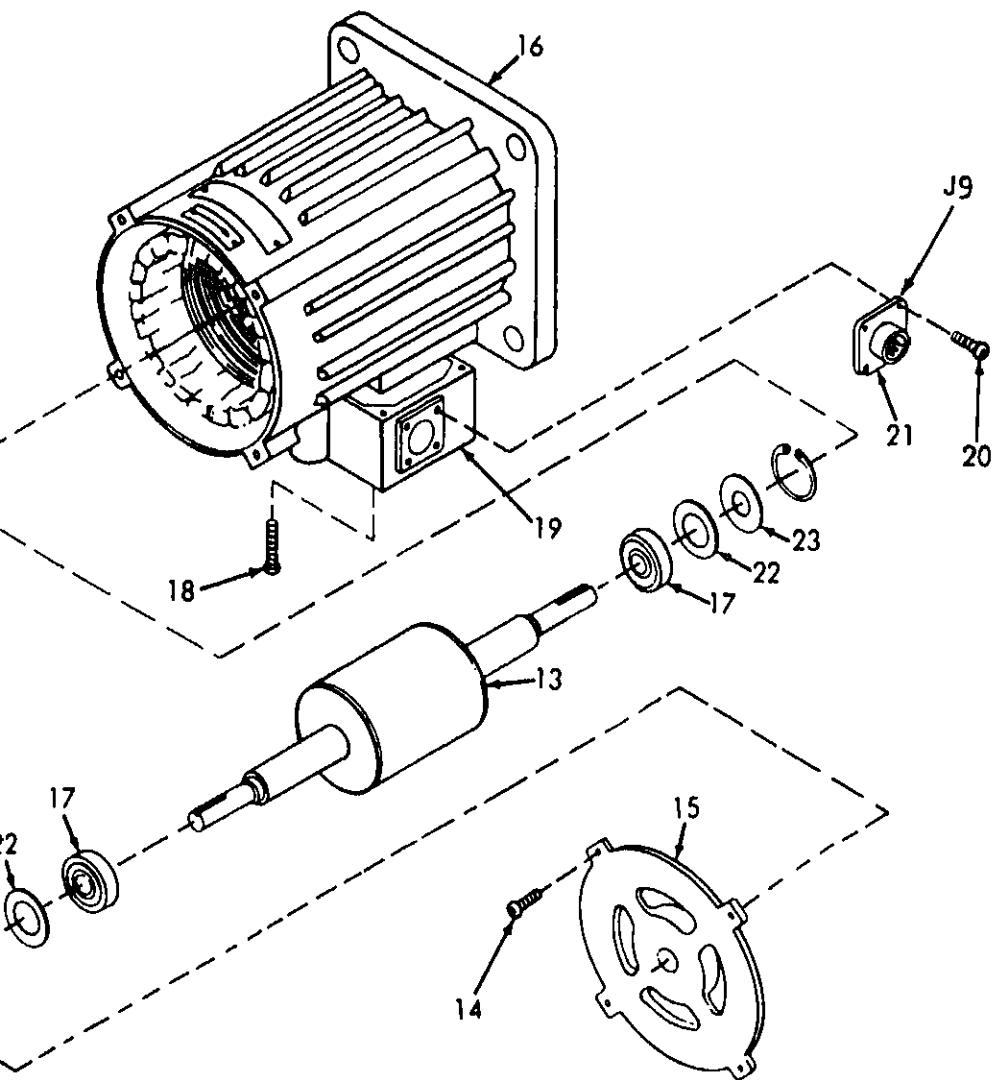
Disassemble the motor only to the extent necessary for repairs.

- (1) Remove four screws (14) and the end plate (15) from the motor.

CAUTION

Keep load spring, shims and washers in their original relationships at disassembly, they will be needed at assembly.

- (2) Withdraw the rotor (13) from the motor.



CONNECTOR
PIN VIEW

(5) Tag wires for identification, and unscrew connector.

(6) Remove four screws from corners of connector and remove connector (21) from junction box.

f. Cleaning.

WARNING

Dry cleaning solvent P-D-680 (item 3, tab 3) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 138°F (38°C to 59°C).

CAUTION

Bearings are permanently lubricated and should not be relubricated at the time of manufacture. Do not attempt to relubricate them. Keep bearings in place or wrap securely in grease-proof paper until ready for assembly.

Blow loose dirt from cavities and windings. Wipe motor faces with a cloth moistened with dry cleaning solvent (E-1).

g. Reassembly (Motor).

- (1) Pull wires through connector hole in junction box and solder them to their respective conductors (See wiring diagram, figure F0-1, for correct connections).
- (2) Install receptacle (21) in junction box with four screws (20).
- (3) Position junction box (19) on motor frame and secure with four screws (18) through motor frame.

- insert the rotor into the stator (10), and guide the bearing into the bearing recess in the stator.
-) Place a bearing (17), shim (22) and load spring (24), that order, over the longer shaft of the rotor (13). Carefully fit end-plate (15) over the assembly, guiding the bearing into the bearing recess.
 -) Secure the end plate (15) to the stator (16) with four screws (14), tightened uniformly in increments. Attempt to turn shaft by hand. If shaft does not turn freely, check assembly of end plate on stator, and adjust if necessary.

ation.

-) Position the flange end of the motor (11) against the partition. Install four flat-head screws (10) through the inlet fan ring (12) and the partition and the hole in the corners for the motor's mounting flange. Place a bushing (9), a washer (8) and a self-locking nut (7) on each screw, and tighten finger-tight.

NOTE

trial-fit resilient washers of the same thickness at first, then replace with different sizes if necessary to center impellers.

-) Place a lock washer (4), flat washer (5), and bushing (6) (flange end toward bolt head) on a socket-head shoulder bolt (3) and partially insert bolt into hole in cross-bar. On top of cross-bar, place a resilient washer (25), large flat washer (26), and small flat washer (27) between the cross-bar and the motor mounting foot. Push bolt and bushing up through the resilient washer, and screw bolt into the motor mounting foot. Repeat assembly in the same order for the other mounting foot. Tighten both bolts uniformly, and check for concentricity of impellers and openings.

Adjust by replacing resilient washers with those of a different thickness, as required. When satisfactory, tighten all mounting bolts, including the four bolts and nuts in the corners of the flange.

-) Connect wiring harness plug, P9, to the receptacle on the motor's junction box. Temporarily connect power to the air conditioner, and turn mode selector switch

- (5) Replace condenser fan assembly (para 4-16).
- (6) Replace condenser fan guard (para 4-16).
- (7) Replace evaporator fan assembly (4-44).
- (8) Replace air filter (para 4-18).
- (9) Replace air intake grille (para 4-11).
- (10) Replace Canvas cover (para 4-8).

4-45. WIRE LEADS AND WIRING HARNESS.

Preferred repair methods consist of replacing wires, connectors, etc. rather than splicing wires, bending terminals, and other make-shift procedures, although appropriate for emergency field repairs. Determine type and length of wire, terminal or connector to be used by referring to Table 4-3, Wire List, and to the wiring diagram (figure FO-1).

a. Soldering Connections. Wire connections must be electrically sound before they are soldered; solder alone provides sufficient strength to prevent breakage. Joining surfaces to be soldered must be clean and bright. If alcohol flux is used, it should conform to Specification MIL-F-4995, and should be brushed onto the joint before soldering. If a flux-core solder is used, it should always be used as such. If an uncured solder is used, it should be preheated (item 12, table E-1). Wires should always be soldered at the point at which the solder will melt completely and not at the edge of the joint. Excessive build-up of solder "gobs" should be avoided or removed.

b. Insulating Joints. The preferred method of insulating electrical joints is by the use of heat-shrink tubing. A piece of heat-shrink tubing of suitable diameter to fit over the joint for covering joints at terminals or connectors, or to cover a 1.2-inch longer than the joint to be insulated, and should be slid over the wire before making the joint. After the joint is made, slide the tubing over the joint, and shrink in place with heat.

three turns. Solder and apply heat-shrink tubing and heat as described above.

Crimping Terminals. To install a terminal on the end of the wire, strip 1/4 to 1/2 inch of insulation from the end of the wire, crimp a piece of heat-shrink tubing (if the terminals are of the crimped type), and insert wire-end into the shank of the terminal. Crimp the shank, and install heat-shrink tubing if necessary.

Table 4-3. Wire List

No.	FROM		TO		Length (Inches)
	Terminal Type	Term. No.	Terminal Type	Term. No.	
Wiring Harness — Control Module					
6N	MS3102R28-11P	J7-A	MS25036-108	E2	3
B	MS3102R28-11P	J7-M	Both in	S1-41	8
B	13211E8288	S1-31	13211E8288	S1-41	2.62
	13211E8288	J7-X	Both in	S1-11	10
	13211E8288	S1-11	MS25036-153	S2-1	8.5
	MS3102R28-11P	J7-W	13211E8288	S1-10	10
6C	MS3102R28-11P	J7-K	13211E8288	S1-4	9
6	MS3102R28-11P	J7-N	13211E8288	S1-1A	11
6A	MS3102R28-11P	J7-J	Both in	S1-22	10.37
6A	13211E8288	S1-32	13211E8288	S1-22	1.75
6	MS3102R28-11P	J7-T	13211E8288	S1-1B	11
6A	MS3102R28-11P	J7-I	13211E8288	S1-2B	10.37
6A	MS3102R28-11P	J7-C	13211E8288	S1-2C	9.37
6A	MS3102R28-11P	J7-V	13211E8288	S1-3A	9.62
6B	MS3102R28-11P	J7-U	13211E8288	S1-3C	8.62
6C	MS3102R28-11P	J7-E	13211E8288	S1-4A	9
6B	MS3102R28-11P	J7-D	13211E8288	S1-4C	8
6	MS3102R28-11P	J7-B	MS25036-106	S8-2	4
6B	MS3102R28-11P	J7-H	13211E8288	S1-21	9.47
6	13211E8288	S1-12	MS25036-153	S2-2	4.5
6	MS25036-153	S2-1	MS25036-106	S8-1	5

I.D. No.	Terminal Type	Term. No.	Terminal Type	Term
Electrical Lead Pressure Cutout Switches				
V7A16	MS25036-153	S6-1	MS25036-153	
Wiring Harness — Power Input to RFI Filter				
X2A10A	MS3100R22-22P	J1-A	MS3106R22-22S	
X3A10B	MS3100R22-22P	J1-B	MS3106R22-22S	
X4A10C	MS3100R22-22P	J1-C	MS3106R22-22S	
X5A10N	MS3100R22-22P	J1-D	MS3106R22-22S	
Wiring Harness — Junction Box Power Input				
X2B10A	MS3102R22-22P	J2-A	MS25036-112	
X3B10B	MS3102R22-22P	J2-B	MS25036-112	
X4B10C	MS3102R22-22P	J2-C	MS25036-112	
X5B10N	MS3102R22-22P	J2-D	MS25036-112	
Wiring Harness — Power Input from RFI Filter				
X2L10A	MS3106R22-22P	P11-A	MS3106R22-22S	
X3L10B	MS3106R22-22P	P11-B	MS3106R22-22S	
X4L10C	MS3106R22-22P	P11-C	MS3106R22-22S	
X5C10N	MS3106R22-22P	P11-D	MS3106R22-22S	
Wiring Harness — Heater				
X15C16A	MS3100R14S-6P	J8-A	MS25036-108	H
X19C16B	MS3100R14S-6P	J8-B	MS25036-108	H
X17C16C	MS3100R14S-6P	J8-C	MS25036-108	H
X8C16C	MS3100R14S-6P	J8-D	MS25036-108	H
X7C16B	MS3100R14S-6P	J8-E	MS25036-108	H
X9C16A	MS3100R14S-6P	J8-F	MS25036-108	H
X24B16A	MS25036-108	HR1-B	MS25036-108	H
X21B16B	MS25036-108	HR2-B	MS25036-108	H
X22B16C	MS25036-108	HR3-B	MS25036-108	H
Wiring Harness — Junction Box				
X43A16A	MS3102R36-7S	J3-P	MS25036-153	K5-
X44A16B	MS3102R36-7S	J3-P	MS25036-153	K5-
X28A16A	MS3102R36-7S	J3-S	MS25036-153	K5-
X23A16B	MS3102R36-7S	J3-h	MS25036-153	K5-
X25A16A	MS3102R36-7S	J3-U	MS25036-153	K5-
Z20A16B	MS3102R36-7S	J3-R	MS25036-153	K5-
V4D16	MS3102R36-7S	J3-Z	MS25036-153	K5-
X39A16A	MS25036-153	K5-A1	MS25036-153	K4-
V4C16	MS25036-153	K5-X2	MS25036-153	K4-
X41A16B	MS25036-153	K5-B1	MS25036-153	K4-

FROM		TO		Length (Inches)	Wiring Size
Terminal Type	Term. No.	Terminal Type	Term. No		
Wiring Harness — Junction Box (Con't)					
MS3102R36-7S	J3-c	MS25036-153	K4-A2	10.63	1
MS3102R36-7S	J3-a	MS25036-153	K4-B2	10.00	1
MS3102R36-7S	J3-X	MS25036-153	K4-C2	9.37	1
MS3102R36-7S	J3-W	MS25036-153	K4-D2	8.75	1
MS3102R36-7S	J3-V	MS25036-153	K4-D1	8.75	1
MS3102R36-7S	J3-O	MS25036-153	K4-X2	9.00	1
MS25036-153	K4-X1	MS25036-153	K6-X1	9.00	1
MS3102R36-7S	J3-f	MS25036-153	XF2-2	14.75	1
MS3102R36-7S	J3-g	MS25036-153	XF2-2	14.75	1
MS3102R36-7S	J3-C	MS25036-106	TB2-1	7.25	1
MS3102R36-7S	J3-E	MS25036-106	TB2-2	7.62	1
MS3102R36-7S	J3-G	MS25036-106	TB2-3	8.00	1
MS3102R36-7S	J3-H	MS25036-106	TB2-4	8.38	1
MS3102R36-7S	J3-1	MS25036-106	TB2-5	8.75	1
MS3106R36-7S	J3-J	MS25036-106	TB2-5	8.75	Y
MS3106R36-7S	J3-K	MS25036-106	TB2-6	9.12	1
MS25036-153	K5-X1	MS25036-106	TB2-6	9.12	1
MS3102R36-7S	CB1-B1	MS25036-112	K1-B2	12.95	1
MS3102R36-7S	J3-v	13216E6191-3	CB1-A2	20.62	1
MS3102R36-7S	J3-w	13216E6191-3	CB1-C2	20.62	1
MS3102R36-7S	J3-D	MS25036-106	TB2-1	7.50	1
MS3102R36-7S	J3-F	MS25036-153	K1-X1	17.37	1
MS3102R36-7S	J3-L	MS25036-108	K2-A1	16.63	1
MS3102R36-7S	J3-M	MS25036-108	K2-B1	15.95	1
MS3102R36-7S	J3-N	MS25036-108	K2-C1	15.50	1
MS3102R36-7S	J3-t	MS25036-112	E1	4.75	1
MS3102R36-7S	J3-Y	MS25036-108	E1	4.75	1
MS3102R36-7S	J3-p	MS25036-106	XF1-4	16.25	1
MS3102R36-7S	J3-d	MS25036-106	TB2-4	10.88	1
MS3102R36-7S	J3-e	MS25036-153	K2-X2	17.37	1
MS3102R36-7S	J3-b	13216E6192	CB1-NO	20.62	1
MS3102R36-7S	J3-x	MS25036-108	TB1-1	12.37	1
MS3102R36-7S	J3-y	MS25036-108	TB1-3	13.50	1
MS3102R36-7S	J3-z	MS25036-108	TB1-2	12.25	1
MS25036-153	K2-X1	MS25036-106	TB2-6	11.49	1
13216E6191-2	CR1-2	MS25036-106	TB2-6	15.62	1
MS25036-112	TB1-2	MS25036-112	K1-B1	13.45	1
MS25036-112	TB1-1	MS25036-112	K1-A1	13.75	1
MS25036-112	TB1-3	MS25036-112	K1-C1	13.75	1
13216E6192	CB1-C	MS25036-153	K1-B1	4.30	1

Wire I.D. No.	FROM		TO	
	Terminal Type	Term. No.	Terminal Type	Term.
Wiring Harness — Junction Box (Con't)				
V13E16N	MS25036-153	K1-X1	MS25036-153	K
X2H12A	MS25036-112	K1-X1	MS25036-112	K
X3J12B	MS25036-112	K1-B1	MS25036-112	K
X4G12C	MS25036-112	K1-C1	MS25036-112	K
X4H16C	MS25036-153	K4-D3	MS25036-108	K
X4K16C	MS25036-153	K4-D3	MS25036-153	K
X2J16A	MS25036-106	XF1-1	MS25036-108	K
X13D16N	MS3102R-36-7S	K3-5	MS25036-153	K
V14B16	MS3102R-36-7S	K3-2	MS25036-106	T
V14A16	MS3102R-36-7S	K3-2	MS3102R36-7S	K
V12B16	MS3102R-36-7S	K3-3	MS25036-106	T
V2A16	13216E6191-2	CR1-3	MS25036-106	X
X35A16A	13216E6191-2	CR1-1	MS25036-106	T
X34A163	13216E6191-2	CR1-4	MS25036-106	T
X33A16A	MS25036-106	T1-H2	MS25036-106	X
X31A16B	MS25036-106	T1-H1	MS25036-106	X
X20A12B	MS25036-112	CB1-B2	MS3102R36-7S	J
V8F16N	MS25036-106	TB2-6	MS25036-108	E
X3L16B	MS3102R36-7S	J3-A	MS25036-108	T
X4L16C	MS3102R36-7S	J3-B	MS25036-108	T
Wiring Harness — System Interconnecting				
V3B16*	MS3106R36-7P	P3-g		S3
V4A16*	MS3106R36-7P	P3-O		S3
X27B16C	MS3106R36-7P	P3-V	MS3106R20-27S	P3
X4D14C	MS3106R36-7P	P3-y	MS3106R28-11S	P7
V6E16	MS3106R36-7P	P3-C	MS25036-153	S7
X13B16B	MS3106R36-7P	P3-b	MS3106R36-7P	P7
X29B16C	MS3106R36-7P	P3-W	MS3106R20-27S	P3
V6B16	MS3106R36-7P	P3-D	MS3106R28-11S	P7
X6B16A	MS3106R36-7P	P3-c	MS3106R28-11S	P7
X19B16B	MS3106R36-7P	P3-M	MS3106R146-6S	P8
X20B16B	MS3106R36-7P	P3-R	MS3106R20-27S	P3
X25B16A	MS3106R36-7P	P3-U	MS3106R20-27A	P3
X15B16A	MS3106R36-7P	P3-L	MS3106R14S-6S	P8
V4E16	MS3106R36-7P	P3-Z	MS3106R28-11S	P7
V10B16	MS3106R36-7P	P3-e	MS3106R28-11S	P7
X32B12C	MS3106R36-7P	P3-w	MS3106R20-15S*	P4
X26B12B	MS3106R36-7P	P3-u	MS3106R20-15S	P4
V11E16	MS3106R36-7P	P3-H	MS3106R12S-3S	P4

FROM		TO		Length (Inches)	Wire Size
Terminal Type	Term. No.	Terminal Type	Term. No.		
Wiring Harness — System Interconnecting (Con't)					
MS3106R36-7P	P3-t	MS25036-157	E3	17.00	12
MS3106R36-7P	P3-G	MS3106R20-16S	P4-D	31.00	16
MS3106R36-7P	P3-K	MS3106R12S-3S	P5-A	35.00	16
MS3106R36-7P	P3-J	MS3106R20-15S	P4-E	31.00	16
MS3106R36-7P	P3-v	MS3106R20-15S	P4-A	31.00	12
MS3106R36-7P	P3-N	MS3106R14S-6S	P8-C	60.00	16
MS3106R36-7P	P3-d	MS3106R28-11S	P7-T	19.00	16
MS3106R36-7P	P3-Y	MS3106R28-11S	P7-A	19.00	16
MS3106R36-7P	P3-f	MS3106R28-11S	P7-X	19.00	16
MS3106R36-7P	P3-x	MS3106R28-11S	P7-J	19.00	14
MS3106R36-7P	P3-z	MS3106R28-11S	P7-M	19.00	14
MS3106R36-7P	P3-a	MS3106R28-11S	P7-U	19.00	16
MS3106R36-7P	P3-l	MS25036-153	S6-2	68.00	16
MS3106R36-7P	P3-S	MS3106R20-27S	P9-E	40.00	16
MS3106R36-7P	P3-h	MS3106R20-27S	P9-D	40.00	16
MS3106R36-7P	P3-p	MS3106R28-11S	P7-C	19.00	16
MS3106R14S-6S	P8-D	MS3106R28-11S	P7-E	69.00	16
MS3106R14S-6S	P8-E	MS3106R28-11S	P7-D	69.00	16
MS3106R14S-6S	P8-F	MS3106R28-11S	P7-V	69.00	16
MS3106R36-7P	P3-P	MS3106R20-27S	P9-G	40.00	16
MS3106R36-7P	P3-T	MS3106R20-27S	P9-H	40.00	16
MS3106R36-7P	P3-X	MS3106R20-27S	P9-J	40.00	16
MS3106R36-7P	P3-A	MS3106R20-16S	P4-G	31.00	16
MS3106R36-7P	P3-B	MS3106R20-16S	P4-F	31.00	16

Pressure switch assembly

performing the following.

- (1) Turn off electrical power supply to disconnect power cable from unit.
- (2) Disconnect drain hose from unit (if

NOTE

Disconnect duct work, CBR filter and remove if used.

- (3) Unbolt unit from mounting surface.
- (4) Close the canvas cover.

4-47. SHIPMENT.

The air conditioner should be moved as follows:

- (1) Short Distance Movement. Lift unit to new work site or lift or carry unit to new work site. Keep unit vertical.
- (2) Long Distance Movement. Crate the unit providing adequate protection for gaseous panel. Refer to TM 38-250 for crating. Provide suitable blocking and tie-downs from shifting during transfer. Keep

For administrative storage of equipment refer to instructions.

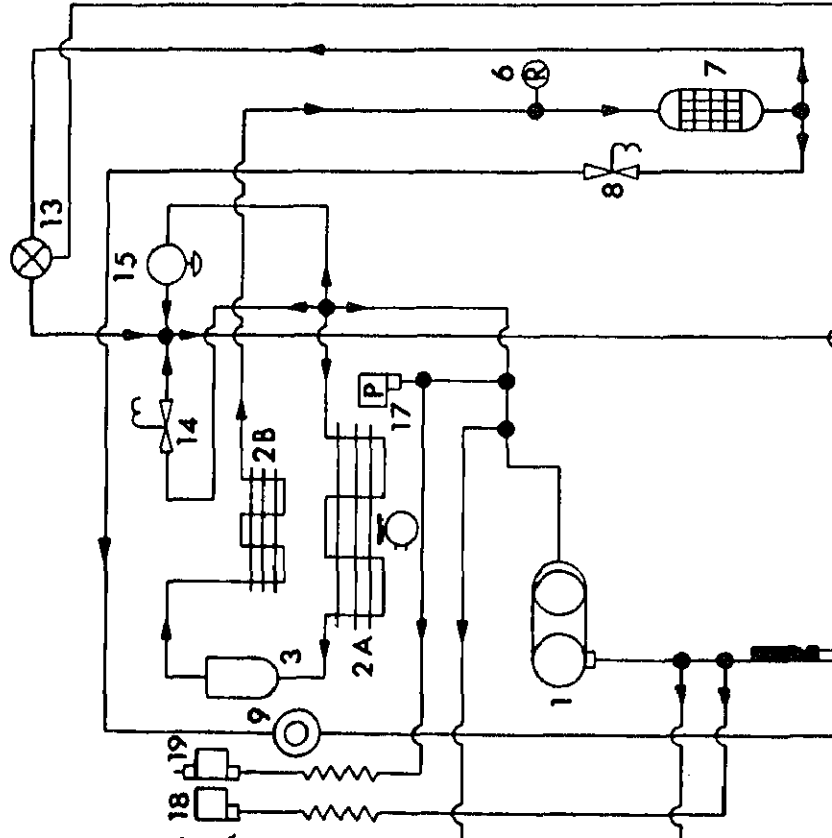
L.

apter is for the use of direct support maintenance. This chapter contains a section on troubleshooting and procedures for discharge, leak testing, evacuation, pressure testing of the air conditioner after the replacement of components that require system discharge. Figure 5-1 is a flow diagram that is included to assist maintenance of components.

Section II. TROUBLESHOOTING

L.

ction contains troubleshooting information (table 5-1) for direct support maintenance personnel. The malfunctions pertain to components only. The organizational maintenance organization chart in Chapter 4 should be reviewed prior to any work on refrigerant components.



- 1.
- 2A.
- 2B.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.
- 17.

Compressor (3 Phase, 50/60 Hz, 208
 Condenser Coil
 Subcooler Coil
 Receiver
 (Not Used)
 (Not Used)
 Pressure Relief Valve
 Filter-drier (Dehydrator)
 Solenoid Valve (Evaporator)
 Sight-glass Liquid Indicator
 Expansion Valve (Evaporator)
 Distributor
 Evaporator Coil
 Expansion Valve (Liquid Quench)
 Solenoid Valve (Bypass)
 Pressure Regulating Valve
 Service Valve
 Pressure Switch (two-speed fan)

T COOLING

Check sight glass liquid indicator for bubbles. If bubbles exist check system for leaks.

air leaks, and recharge system (para 5-5 through 5-8).

Feel filter-drier (dehydrator) to see whether it is cold to the touch, or is frosted or sweating. Cold discharge indicates obstruction.

Charge system slowly over a period of about one hour to prevent oil being blown out of system, then replace filter-drier (para 5-15).

Check inlet and discharge sides of solenoid valves for temperature difference. Abnormally cold discharge indicates leakage or obstruction.

Repair or replace faulty solenoid valve (para 5-14).

Check evaporator coil for over-all temperature. If part of coil is relatively warm, and evaporator refrigerant inlet is sweaty or frosty, expansion valve may be damaged or obstructed.

Replace faulty expansion valve (para 5-22).

NOISY OPERATION

CAUTION

Knocking or hammering is heard when air conditioner is started up, shut down at once. Compressor may be pumping liquid refrigerant, which will cause severe damage.

Listen for knocking or hammering sounds. Install gauge set and check for high discharge pressure (para 5-8).

Reduce off some refrigerant (para 5-3).

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

3- COMPRESSOR WILL NOT START

Step 1. Check condition of high- and low-switches by pressing reset button pressure cutout switches (para 5-

Step 2. Disconnect plug, P4, from compressor an ohmmeter or continuity tester, points A-B, A-C, B-C, and D-E. C indicated. Test points A, B and or common ground. No continuity

Replace compressor that does not meet requirements (para 5-9).

4- COMPRESSOR STARTS BUT STOPS AT ONCE -- "SHORT"

Step 1. Check sight-glass liquid indicator compressor is operating. If bubbles refrigeration system for leaks (p

Repair leaks, and add refrigerant until when compressor is running.

Step 2. Connect pressure gauges to suction service valves. Check system pressures indicated in the following Table:

NORMAL TEMPERATURE — PRESSURE RE

95°F (36°C) dry bulb return air to unit				
<i>Outdoor ambient temperature</i>	50°F 10°C	75°F 24°C	100°F 38°C	
<i>Gauge Pressures</i>				
Suction (psig)	56-60	56-65	65-75	
(Kg/Cm ²)	3.93-4.22	3.93-4.57	4.57-5.27	
Discharge (psig)	135-155	185-205	275-295	
(Kg/Cm ²)	9.50-10.90	13.00-14.41	19.33-20.74	

80°F (27°C) dry bulb return air to unit

50°F 10°C	75°F 24°C	100°F 38°C	125°F 52°C	
56 min. 3.93 "	56 min. 3.93 "	56-65 3.93-4.57	65-75 4.57-5.27	
130-150 9.14-10.55	180-200 12.65-14.06	270-290 18.98-20.39	290-410 20.39-28.82	

b temperatures are measured with an ordinary thermometer

f pressures are too low, check for leaks and add refrigerant; if too high, bleed off refrigerant until pressure normal.

- . If pressures are normal, turn off power, and short-circuit high- or low-pressure cutout switch. Turn on power for maximum of 12 seconds, and see whether compressor operates normally.

CAUTION

o not exceed 12-second operating time, or vacuum may be formed in suction side of refrigeration system and damage compressor.

bleed off refrigerant slowly, over a period of about one hour, to prevent oil being blown out of system, then replace faulty pressure cutout switch and recharge system

OR RUNS BUT DOES NOT COOL

- . Check sight-glass liquid indicator for bubbles indicating low charge of refrigerant. If bubbles are present check refrigeration system for leaks (para 5-5).

discharge system slowly, over a period of about one hour, prevent oil being blown out of system, then repair leaks replace leaking component.

- Step 2. Remove evaporator air discharge gas from evaporator coil icing. If icing is present, use gas bypass pressure regulating valve (see pressure).

CAUTION

Do not use steam, open flame, heat gun, or high-temperature heat source to thaw evaporator coil.

Thaw an iced coil with a lamp bulb (75-watt) or electric fan, and adjust pressure.

- Step 3. Check compressor motor for noisy operation, high pressure, or excessively low discharge pressure indicating leaky internal valves.

Bleed off refrigerant slowly, over a 24-hour period, to prevent oil being blown out of the compressor and recharge system.

6- SUCTION PRESSURE TOO LOW OR TOO HIGH

- Step 1. Stop compressor and check thermosiphon as follows:
- Remove insulating compound from remote bulb from refrigerant line. (Note: Remove compound and be sure it is replaced.)
 - Place bulb in ice water for 1-2 minutes.
 - Remove bulb from ice water and hold it warm. At the same time, start the suction line for a rapid change. If the indicator indicates flood-through of liquid, the valve is operating. If not, valve or remote bulb is faulty.

CAUTION

not let liquid flood back into compressor for more than 2-3 seconds or the compressor will be seriously damaged.

Discharge refrigerant from system slowly, over a period of about one hour, to prevent blowing oil out of system. Replace faulty expansion valve and filter-drier (para 5-22 and 5-15). Purge with dry nitrogen and recharge (para 5-7).

Feel filter-drier for temperature difference. Discharge end will feel cooler than input end if clogged, or discharge end may be sweaty or frosty.

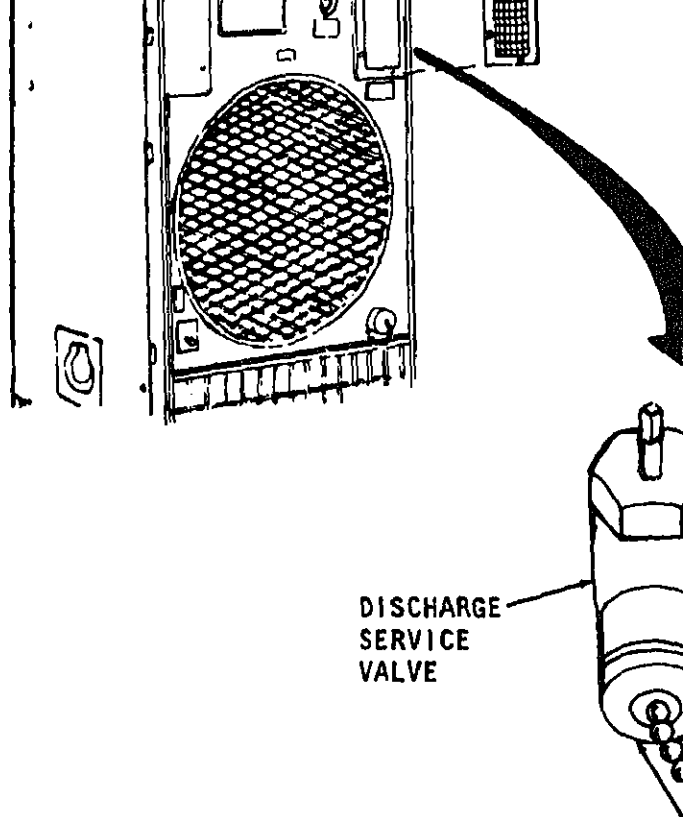
Discharge refrigeration system slowly, over a period of about one hour to prevent blowing oil out of system. Replace filter-drier, purge with dry nitrogen, and recharge.

Section III. MAINTENANCE PROCEDURES

DISCHARGE.

When removing any refrigeration component from the air conditioner, refrigerant gas must be discharged from the system. (Figure 5-2.) Proceed as follows:

- Remove five screws from the frame of the fresh air screen in the upper right-hand corner of the rear surface of the air conditioner. Remove the fresh air screen to obtain access to the suction and discharge service valves.
- Remove the chained cap from the suction service valve, and connect a hose of sufficient length to reach a safe location, preferably outdoors, for discharge of refrigerant gas.



REMOVE

Figure 5-2. System Disc

WARNING

Use great care to avoid contact with refrigerant or refrigerant gas being discharged from a container under pressure. Sudden expansion of refrigerant gas can result in severe tissue damage. Wear safety glasses and face protection. Use proper protective gloves and a face mask in a situation where skin- or eye-contact with refrigerant gas is possible. Prevent contact of refrigerant gas with metal surfaces. Heat causes the refrigerant to break down and form carbonyl chloride, a highly toxic and corrosive gas.

- 3 - Crack open the suction service valve to allow refrigerant gas slowly, even a

nitrogen is always used to purge the refrigeration system during brazing or debrazing of connections, to prevent internal oxidation and scaling.

nitrogen (item 8, table E-1) flowing through the system connections can be debrazed. Refer to paragraph 5-13(4), Protection from Heat, for details of tubing repair, disconnection, and replacement.

WARNING

Urethane Foam insulation breaks down to form toxic gases when heated to brazing temperatures. Refer to paragraph 5-13(4), Protection from Heat.

ING.

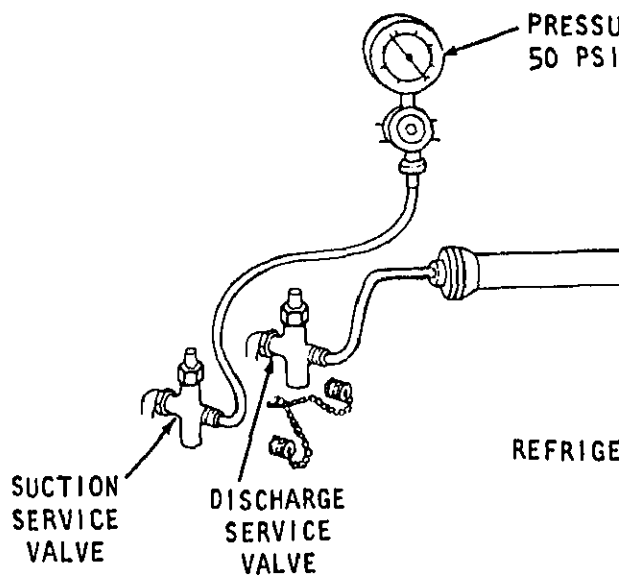
the refrigeration system after repair or replacement. Refer to figure 5-3 and proceed as follows:

1. Connect a pressure gauge to the suction service valve, and a refrigerant (item 11, table E-1) cylinder to the discharge service valve. Open both service valves and the cylinder shutoff valve. Let the refrigerant flow into the system until the pressure gauge indicated 22 psig (22 in. H₂O). Close cylinder shutoff valve and discharge valve. Disconnect the refrigerant cylinder.

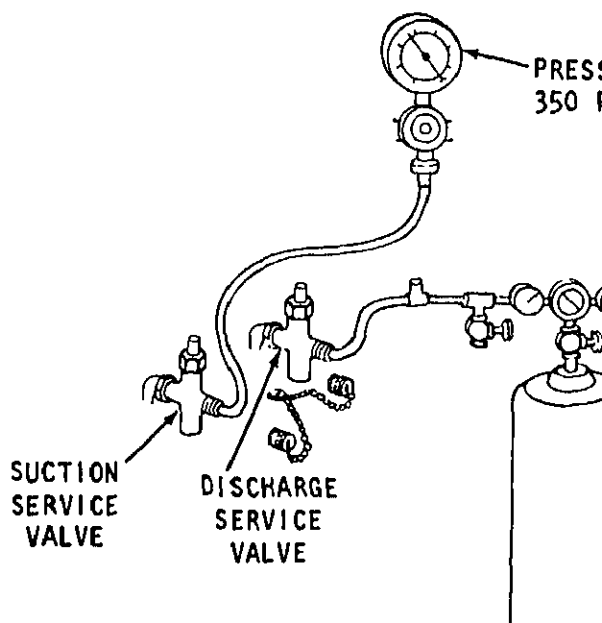
2. Connect a cylinder of dry nitrogen (item 8, table E-1) to the suction service valve. Open the cylinder shutoff valve and the discharge valve, and pressurize the system to 350 psig (22 in. H₂O). Close all three valves, and test for leaks, using an electronic leak detector, or the soap bubble method as described in paragraph 5-13(4), Protection from Heat.

CAUTION

The electronic leak detector is sensitive to the presence of refrigerant gas (item 11, table E-1) in the atmosphere. When refrigerant gas is present in the atmosphere of the work area, false indications can result. Use in a well ventilated but fume-free area.



CORRECTING REFRIGERANT



and watch for bubbles. Follow a definite sequence to check any points that should be tested. Wipe the solution onto the surface, and mark any point at which a leak is found.

Charge the system after leak testing by connecting a hose to the service valve, and cracking the valve open slightly to admit the gas. Too rapid discharge will cause oil to be drawn into the compressor. If leaks were detected, repair them and retest as directed above. If the system is leak-tight, double evacuate the system as directed below.

TESTING THE SYSTEM.

When the system is charged with refrigerant, it must be double evacuated to exhaust water vapor, non-condensable gases and other impurities which would prevent the system from operating. Refer to Figure 5-4 and proceed as follows:

NOTE

The following instructions are provided for use by refrigeration shops furnished with only the most basic equipment. If more sophisticated equipment, such as two-valve or four-valve service manifolds is available, it should be used by making appropriate modifications to these instructions.

Connect a vacuum pump to the suction service valve gauge port, and the discharge service valve gauge port. Start the pump and open both service valves. Operate the vacuum pump until the system is reduced to not more than 500 microns. Close both service valves, and turn the vacuum pump off. Let the unit stand in this condition for at least three hours. If the system holds the vacuum without change of pressure, continue with step b. If the vacuum cannot be held for three hours, break the vacuum with nitrogen and retest for leaks. If 500-micron vacuum cannot be held for one or more of the following reasons may account for the failure:

1. Presence of water vapor in the system. Continued pumping will not reach this condition.

2. Leaks in the refrigeration system. Break the vacuum with nitrogen (item 8, table E-1), and retest for leaks (para 5-5).

3. Internal leakage of vacuum pump. Test the pump by connecting the pump gauge directly to the vacuum pump intake and continue to pump. If the pump still fails to reach 500 microns, the pump is faulty.

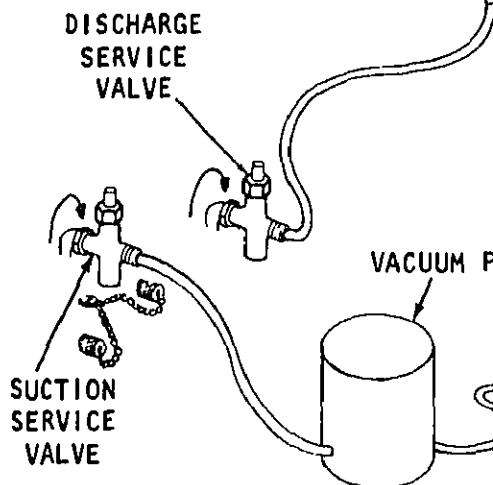


Figure 5-4. Evacuating the system.

b. With the suction line service valve closed, connect the vacuum pump and attach a cylinder of dry nitrogen (E-1). Leave the connection to the suction service valve loose, and open the nitrogen cylinder shutoff valve for a few seconds to purge the line of air. Tighten the connection, then open the suction service valve slightly to break the vacuum. Leave this configuration until the system reaches atmospheric pressure (760 mm) then close the suction service valve and the nitrogen cylinder valve, and disconnect the nitrogen cylinder.

c. Reconnect the vacuum pump to the suction service valve port, and start the pump. Open the suction service valve and run the pump until a 500-micron vacuum is achieved. The pump will remove all traces of water vapor and non-condensable gases from the system. Close the suction service valve, and disconnect the vacuum pump. Close the discharge service valve, and install the pressure gauge.

service valve connections. Charge the refrigeration system in the following steps:

CAUTION

Do not attempt to charge liquid refrigerant into the suction line. The compressor would be damaged.

NOTE

Two kinds of refrigerant cylinders are in general use. One is equipped with a single shutoff valve, and must be inverted when charging liquid refrigerant. The other is equipped with a vapor valve and a liquid valve, which makes it possible to charge either liquid or vapor when the cylinder is upright. When using the two-valve cylinder; disregard instructions to position the shutoff valve down, and connect the service line to the liquid valve instead.

Place the refrigerant cylinder on a scale of sufficient capacity with the shutoff valve down, or suspend the cylinder from a beam scale, with the valve end down.

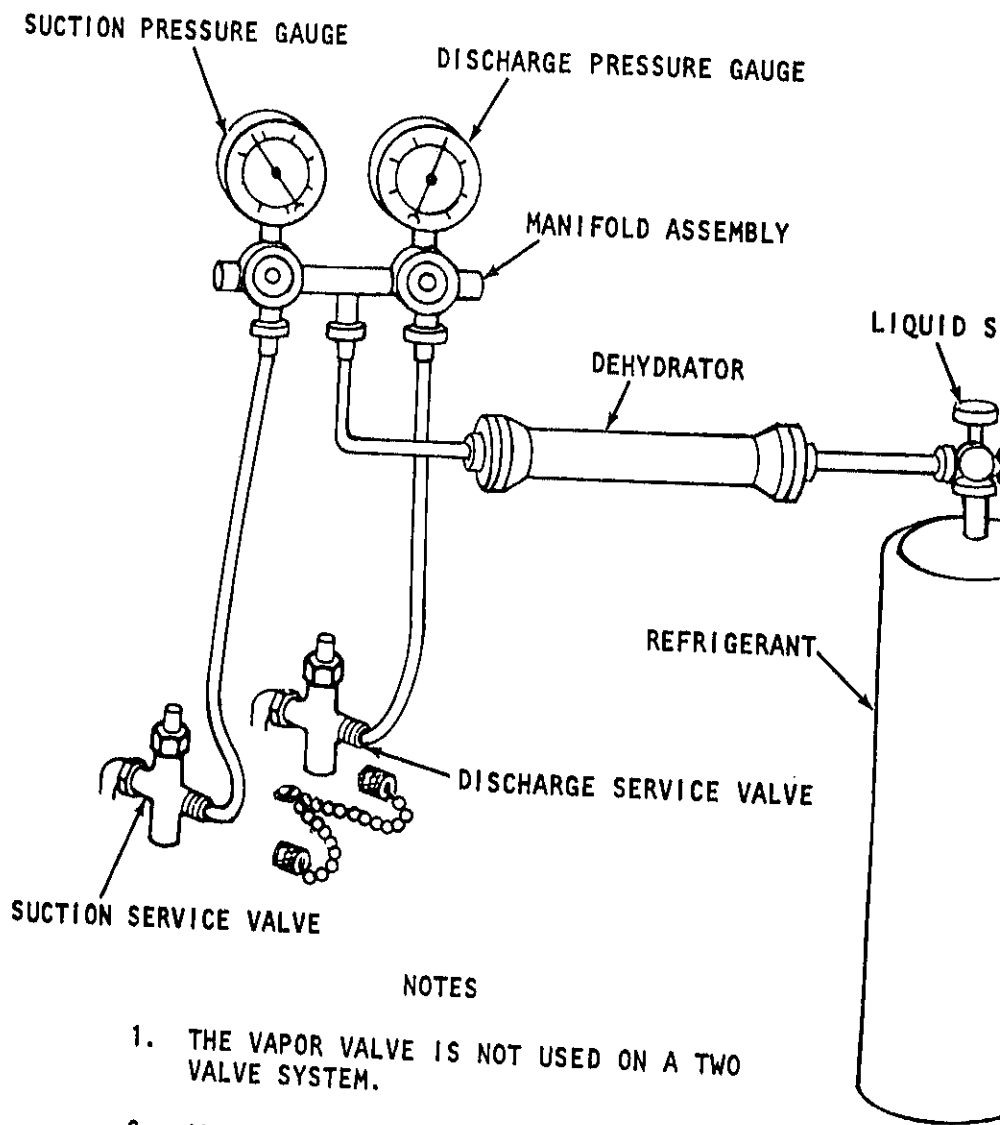
Weigh the cylinder, and record the weight.

Close the discharge service valve, and slightly open the shutoff valve. Liquid refrigerant will be sucked into the system rapidly at first, then more slowly as pressures equalize. When 5.0 pounds (2.27 kg) of refrigerant have been added to the refrigeration system, close the discharge service valve and the cylinder shutoff valve.

NOTE

The junction box and control panel assemblies and the power panel must be in place to operate the air conditioner and to complete the charging operation. If they were removed for maintenance, install them now, in accordance with paragraphs 4-24 and 4-28.

Recharge the system with refrigerant as necessary, in the same manner.



NOTES

1. THE VAPOR VALVE IS NOT USED ON A TWO VALVE SYSTEM.
2. IF A ONE VALVE CYLINDER IS USED INVERT THE CYLINDER.

refrigerant before attempting another start.

With power connected to the air conditioner, turn the rotary switch to COOL and the temperature control thermostat to the RELEASE position. Let the air conditioner operate for 15 minutes in this mode, then observe the sight-glass liquid indicator. If the air conditioner is running. If bubbles or milkiness appear, the refrigerant charge is low. Add refrigerant as follows:

With the air conditioner compressor operating, open the suction service valve and the cylinder shutoff valve to charge refrigerant into the system. Continue to observe the sight-glass liquid indicator.

When the liquid in the sight-glass liquid indicator runs free of bubbles, close the suction service valve and the cylinder shutoff valve.

Disconnect the manifold assembly and the refrigerant pressure gauges and pressure-test the air conditioner.

PRESSURE TESTING.

Pressure testing the refrigeration system is an important procedure which you should perform whenever the system has been recharged after replacement of a component or when the system is operating inefficiently. Pressure testing is accomplished by connecting individual pressure gauges or a refrigeration manifold to the suction line and discharge line service

ports. Every refrigeration system has its own specific design pressures for the suction and discharge sides of the compressor at a given ambient temperature. The temperature-pressure design values for the air conditioner are shown in Table 5-2.

Outdoor ambient temperature	50°F 10°C	75°F 24°C	100°F 38°C
Gauge Pressures			
Suction ₂ (psi) (Kg/Cm ²)	56-60 3.93-4.22	56-65 3.93-4.57	65-75 4.57-5.27
Discharge ₂ (psi) (Kg/Cm ²)	135-155 9.50-10.90	185-205 3.00-14.41	275-295 19.33-20.74

80°F (27°C) dry bulb return air to u

Outdoor ambient temperature	50°F 10°C	75°F 24°C	100°F 38°C
Gauge Pressures			
Suction ₂ (psi) (Kg/Cm ²)	56 min. 3.93 "	56 min. 3.93 "	56-65 3.93-4.57
Discharge ₂ (psi) (Kg/Cm ²)	130-150 9.14-10.55	180-200 12.65-14.06	270-290 18.98-20.39

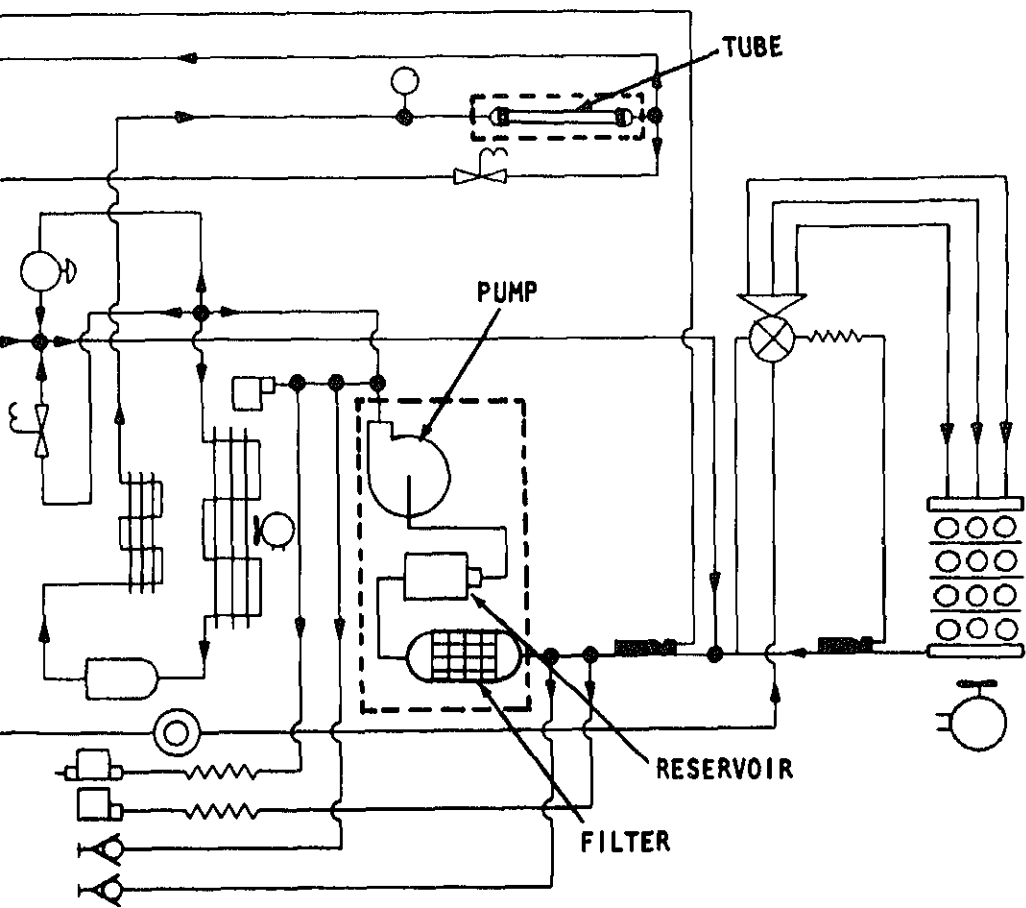
NOTE: Dry bulb temperatures are measured with an ordinary

b. Set up. Prepare the air conditioner for shown in figure 5-6 and as directed in the following

(1) Make sure that the fresh air damper is closed, and that the evaporator air intake and discharge are fully open.

(2) Hang an accurate thermometer directly in front of the evaporator air intake grille to register "dry bulb temperature."

(3) Hang an accurate thermometer directly in front of the condenser coil guard, making sure that the thermometer is not in direct sunlight, to record "outdoor ambient temperature."



c. Procedure. Perform the pressure test in

(1) Turn the rotary selector switch to COOLING control thermostat to maximum DECREASE.

(2) Slowly open the suction line and discharge valves to which pressure gauges have been connected.

(3) Let the air conditioner operate for 15 minutes in the cooling mode, so that all parts of the system are cooled.

(4) Record the temperatures indicated by the thermometers and the pressures indicated by both pressure gauges.

(5) Compare the readings obtained from pressure gauges with the normal ranges shown in Table 5-2.

d. Analysis of Discrepancies. If actual pressure-temperature relationships differ from those shown in Table 5-2, check for the following reasons, and take appropriate action.

(1) If pressures are too low: Check for leaks (paragraph 5-5), repair, recharge the system (paragraph 5-6), and repeat the pressure test.

(2) If pressures are too high: Close the service valves, remove the pressure gauge, and bleed off the excess refrigerant. Repeat the pressure test.

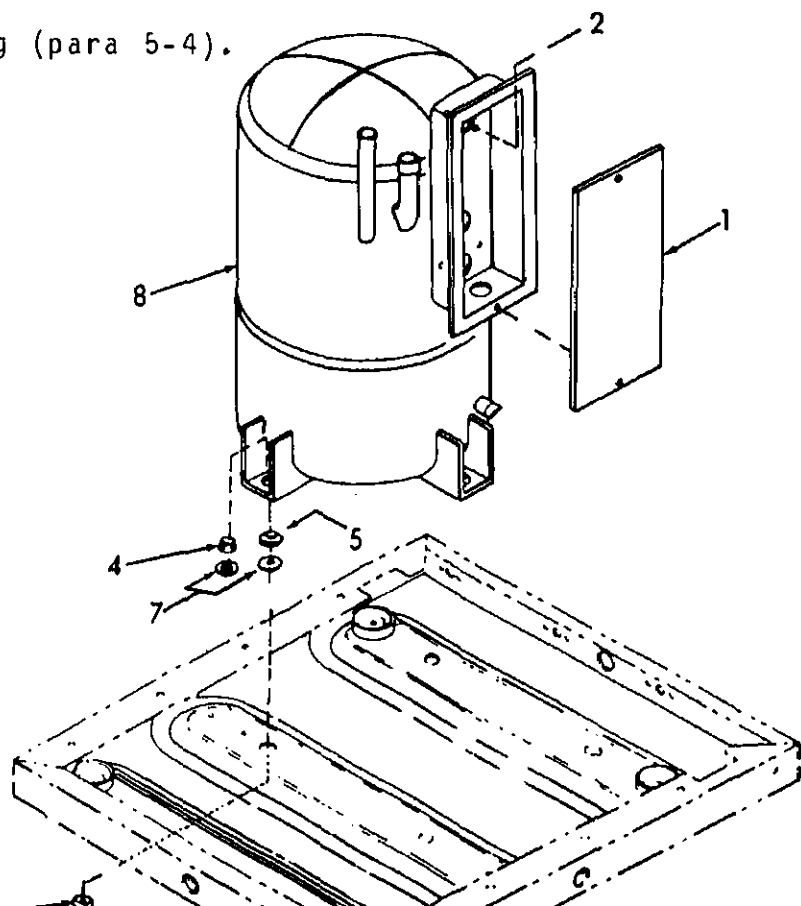
(3) If discharge pressure is extremely high and suction pressure is extremely low, blockage may exist in the refrigerant line. Troubleshoot, correct the trouble, recharge if necessary, and repeat the pressure test.

e. Completion. After pressure testing has been completed, close both service valves, remove gauges and thermometers, and install fresh air screen, and secure it. Remove thermometers from the unit.

refrigeration compressor is a self-contained unit which reciprocating compressor, a drive motor and a life time oil hermetically sealed into a dome-shaped steel housing. A type crankcase heater is mounted around the outside of the housing near the base. The purpose of the crankcase heater is to prevent migration of liquid refrigerant into the compressor. Liquid refrigerant could mix with the oil, causing the oil to be pumped throughout the system. Also, fluids are incompressible and would cause serious damage to the compressor if permitted to enter while operating.

Primary Requirements.

- (1) System discharge (para 5-3).
- (2) Remove lower panel (para 4-12).
- (3) Remove junction box (para 4-28).
- (4) Compressor tests (para 4-40.1).
- (5) Debrazing (para 5-4).



When hoisting the air conditioner by sling through the handles, use a sp prevent the sling damaging the casing.

(a) Hoist the air conditioner onto support height to permit insertion of a socket wrench mounting holes in the base plate.

(b) Remove four shoulder bolts (3) and (5) and eight of each size of washers (6 & 7) legs of the compressor (8).

(c) Lever the compressor up, and slide conditioner.

d. Installation.

NOTE

If refrigeration piping was disconnected, compressor being replaced, transfer the replacement compressor before installing the air conditioner.

(1) Mounting. Set the compressor in place on the plate of the air conditioner. Lift up, and insert bushings (5) and support feet. Install shoulder bolts (3) & (5) from below, and install nuts of mounting foot.

(2) Tubing Connection. Provide a 1 flow of dry nitrogen (item 8, the refrigeration system, and braze the compressor.

(3) Replacement of Filter-Drier.

NOTE

Whenever the refrigeration system has a new filter-drier must be installed (See para 5-15).

5-5 through 5-8.

SUR MOTOR BURNOUT.

If a compressor motor is indicated by lack of continuity in windings and the condition of compressor oil, which must be checked after the compressor has been removed from the refrigeration system. Causes of compressor motor burnout include the

1. Low voltage, which causes motor windings to overheat. If the motor burns out completely, the overheated windings cause chemical reactions with the refrigerant and the oil to form sludge and other contaminants.

2. Low refrigerant. An inadequate charge of refrigerant gas reduces the amount of cooling gas within the compressor, causing gradual overheating of the motor and failure of the

3. High head pressure. High head pressures can be caused by dirty condenser coils or screens, or by an inoperative expansion valve. High head pressure requires the compressor to work harder, adding additional heat which ultimately can result in motor burnout. Adequate ventilation around the condenser, and extremely high ambient temperatures can also cause motor failures.

4. Air in system. Leakage of air into the refrigeration system starts a chain reaction which can result in motor burnout. Air reacts with oil and moisture which combine with refrigerant gas to form hydrochloric and hydrofluoric acids. These combine with compressor oil to form an acid sludge which is carried throughout the system and eventually coats the motor windings, causing short circuits and

PREVENTING COMPRESSOR MOTOR BURNOUT.

It is important to diagnose the type of compressor motor failure before attempting repairs. Simple failure, without motor burnout, does not require extensive cleaning of the entire refrigeration system. If burnout occurs, Also, motor burnout indicates other problems that contributed to the failure, and these problems must be corrected to prevent repetition of the burnout. After removal of the compressor from the refrigeration system, remove all external oil from the compressor toward the discharge port to drain a sample of oil into a clear glass container. If the oil is clear, and does not have an acrid smell, the compressor did not

You must clean the entire refrigeration system if a leak has occurred, since contaminants will have been in the corners and restrictions in the piping and fittings. Contaminants will soon mix with new refrigerant gas and cause repeated burnouts. To clean the system, the procedure follows:

a. Remove the filter-drier (para 5-15), and disconnect it from the refrigeration system. To do this, connect a nitrogen cylinder (item 8, table E-1) to each filter-drier fitting and open the cylinder shutoff valve for at least 10 minutes at a minimum (3.5 kg/cm²) pressure.

b. Connect the two filter-drier fittings with a new filter-drier manufactured from refrigerant tubing and fittings to the reservoir and filter in place of the compressor.

c. Disassemble both expansion valves and their respective valve cages. Re-install shell of power assembly and a new gasket manufactured gasket between power assembly and shell. Tag and retain valve cages for use at reassembly.

NOTE

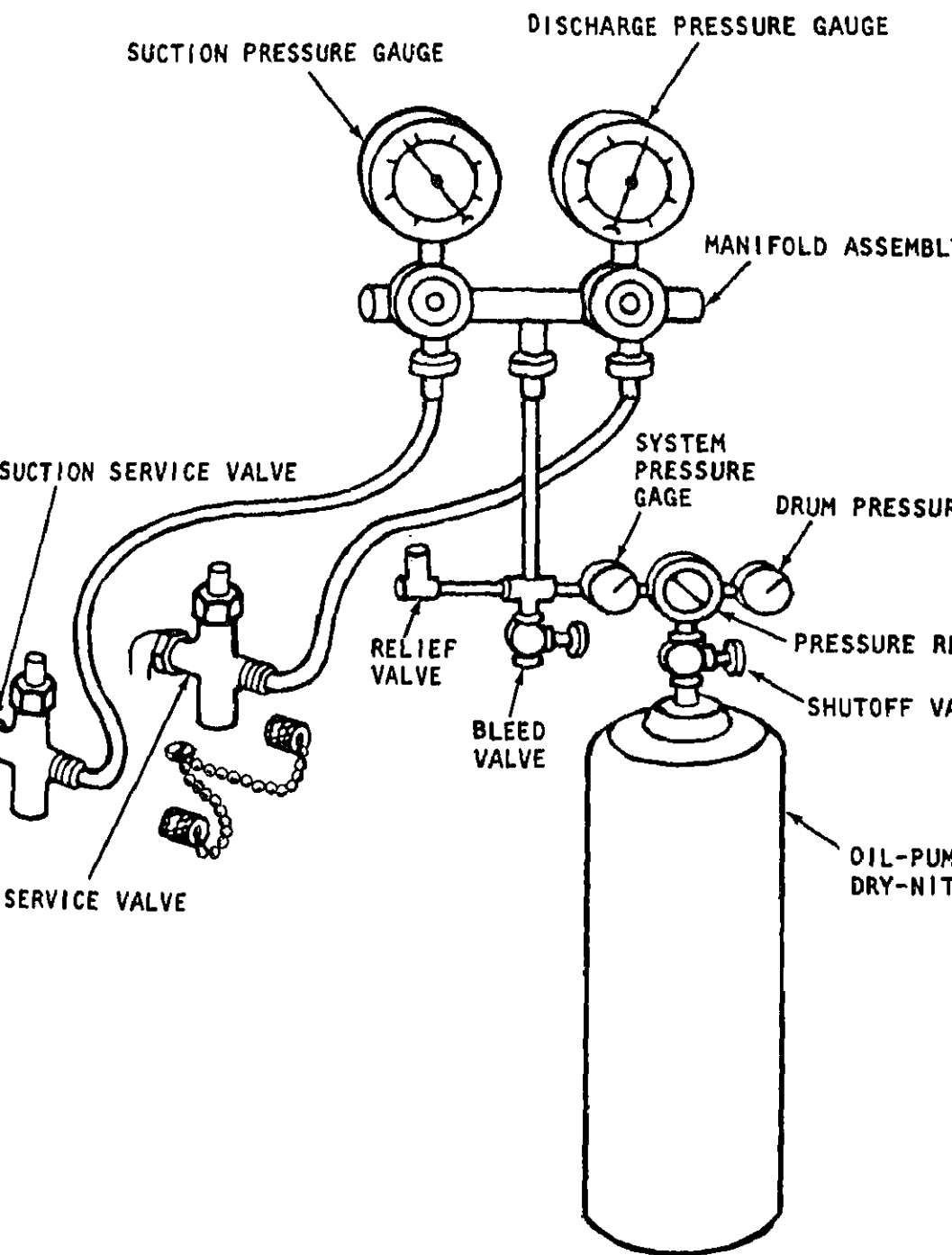
An unused filter-drier or other suitable filter may be used as the filter.

d. Fill reservoir with fluorocarbon refrigerant (item 8, table E-1) and start the pump. Continue filling the reservoir with refrigerant, until it begins to pour out of the return line. Stop flushing for at least 15 minutes.

NOTE

During flushing and back-flushing, apply 24 volts, dc, to the bypass line solenoid for a total of approximately 10 minutes. This will ensure that the cleaning solution flows through all parts of the system.

e. Reverse the pump connections, replace the filter-drier with a new filtering medium, and back-flush the system for 10 minutes.



cages. Install new gaskets, and assemble the valve projections on valve cages fit in notches in valve

h. Disconnect the dry nitrogen cylinder, and install a new filter-drier, making sure that the direction points up. Cap or plug compressor connections if they be installed immediately.

i. Replace compressor, evacuate and charge system.

5-11. PRESSURE SWITCHES.

a. Description.

The pressure switches, high pressure, low pressure (fan speed) are located in the same assembly. The rear of the air conditioner near the fresh air screen. If the pressure switch requires replacement, all of the switches must be disconnected and the assembly removed as one unit.

b. Preliminary tests.

High/Low Pressure (para 4-41.1).

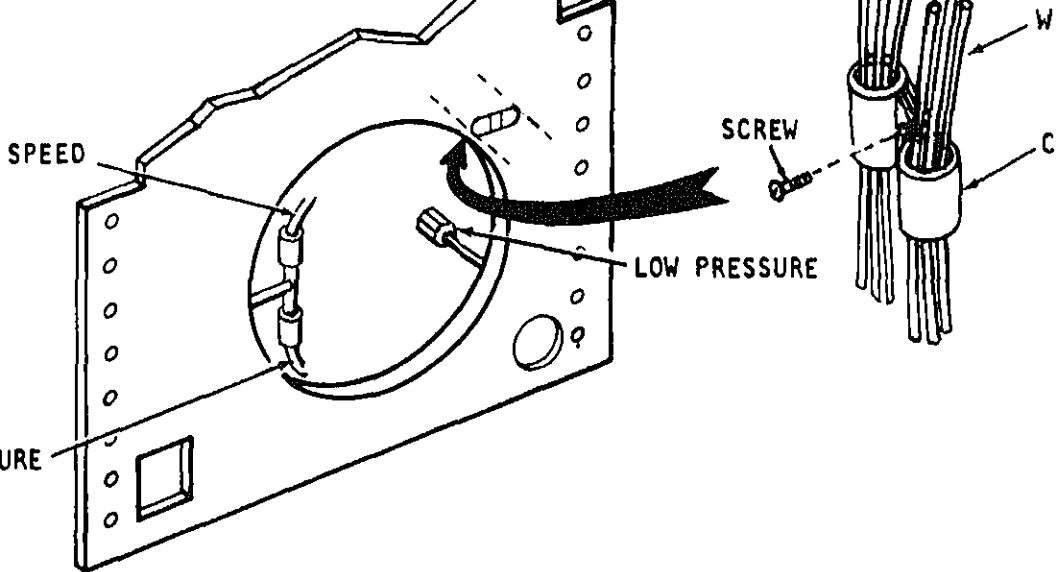
Pressure Switch (para 4-41.2).

WARNING

Disconnect power from the air conditioner before performing maintenance on the electrical system. The voltage used can be lethal.

c. Preliminary Requirements.

- (1) Remove fresh air screen (para 4-14).
- (2) Discharge system (para 5-3).
- (3) Remove canvas cover (para 4-8).
- (4) Remove top panel (para 4-9).
- (5) Remove condenser fan guard (para 4-44.1).
- (6) Remove condenser fan (para 4-44.2).



1.

(1) Remove screws (1) near each end of the pressure switch reset information plate (2).

(2) Leave pressure switch assembly in place.

WARNING

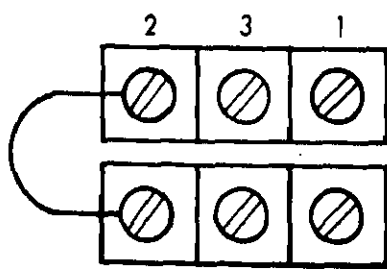
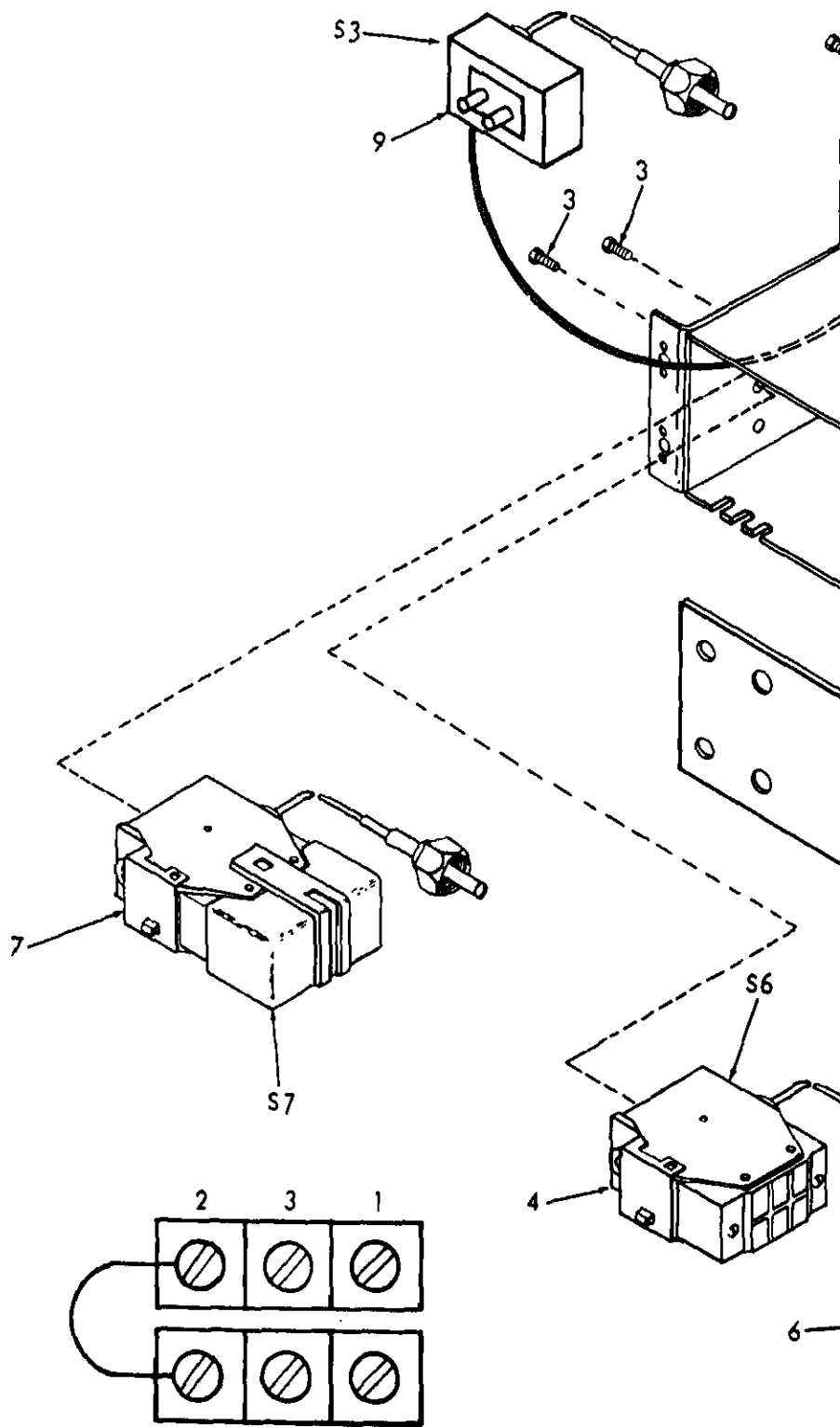
Do not perform the following operation until all refrigerant has been discharged from the system (para 5-3). Escaping refrigerant gas under pressure can cause permanent tissue damage from sudden freezing.

(3) Reach into the upper right corner and remove clamp securing capillary tubes and wiring harness.

NOTE

It is not necessary to remove all pressure cut-out switches.

(4) Both the high and low pressure cut-out switch connections to the refrigeration system are located near the compressor, the low-pressure cut-out switch in a cross fitting in the suction line, and the high-pressure



NOTE

The pressure cut-out switch housing is not removed from the unit.

mbly.

-) Remove screws (3) in the end of the housing, and remove both the high and low pressure cut-out switches (4 & 7). Be careful to avoid kinking the capillary tubes when removing them from the notches in the edge of the housing.
-) Pry off spring clip (5) on end of pressure cut-out switch, and remove the spring clip (5) and the cover (6) from the wire connections. Disconnect wires as necessary.
-) Remove screws (8) in the end of the housing and remove the fan speed pressure switch (9).
-) Disconnect wires as required.
-) Test the high-pressure cut-out switch (S7) as follows:
 - (a) Connect the high-pressure cut-out switch to an ohmmeter, multimeter or other continuity testing device.

CAUTION

Do not use compressed air for testing the pressure cut-out switches. Oil, moisture and other impurities could be carried into the refrigeration system.

- (b) Connect the capillary flare nut to a cylinder of dry nitrogen (item 8, table E-1), and slowly pressurize the switch assembly.
- (c) When pressure gauge indicates 415 psig (29.17 kg/cm²) press and release reset button. Continuity should be indicated.

tinuity should be indicated.

- (2) Test the low-pressure cut-out switch
 - (a) Connect the low-pressure cut-out continuity tester and the source (see figure E-8, table E-1), as directed in figure E-8.
 - (b) Slowly pressurize the switch to 29.17 kg/cm^2 and press reset button. Continuity should be indicated.
 - (c) Continue to pressurize the switch to 29.17 kg/cm^2 . Continuity should be indicated at all times.
 - (d) Slowly reduce pressure. Continuity should be indicated at $7 \pm 5 \text{ psig}$ ($0.5 \pm 0.35 \text{ kg/cm}^2$).
 - (e) If pressure-continuity requirement is not met, replace the pressure cut-out switch.
- (3) Test the fan speed pressure switch.

CAUTION

Do not use compressed air to pressurize the switch. Traces of oil, moisture and other contaminants may be carried into the refrigeration system.

- (a) Connect a cylinder of dry nitrogen (see figure E-1) to the body of the pressure switch and pressurize the switch.
- (b) Observe the pressure gauge and continuity tester. Continuity should be indicated when pressure reaches $400 \pm 10 \text{ psi}$ ($27.6 \pm 1.13 \text{ kg/cm}^2$).
- (c) Gradually reduce pressure to $25 \pm 5 \text{ psi}$ ($1.72 \pm 0.35 \text{ kg/cm}^2$) observing the pressure gauge and continuity tester. Continuity should drop when pressure reaches $25 \pm 5 \text{ psi}$ ($1.72 \pm 0.35 \text{ kg/cm}^2$).
- (d) Replace the pressure switch if pressure and continuity requirements are not met.

-) Attach wires to the fan speed pressure switch (9).
 -) Install a split grommet on the capillary tube and insert grommet in left-hand notch.
 -) Insert the fan speed pressure switch (9) and secure with screws (8).
 -) With terminal covers removed from both pressure cutout switches, connect the short wire from terminal 2 of the high-pressure switch to terminal 2 of the low-pressure switch.
 -) Connect wire leads to terminal 2 of the high-pressure switch and to terminal 1 of the low-pressure switch. Tag the leads for identification. Install both terminal covers (6) and retaining clips (5).
 -) Install a split grommet on both capillary tubes, and insert the low-pressure cutout switch (4) in the lower part of the housing. Secure with two screws (3). Form the capillary tube along the back of the housing in the middle notch.
 -) Insert the high-pressure cut-out switch (7) in the upper part of the housing. Lead capillary tube to the remaining notch. Secure switch with two screws (3). Install capillary tubes and grommets in notches. Tag connection end for identification.
- ation.
-) Slowly lower the pressure switch assembly into the top of the unit while guiding the capillary tubes into the proper positions. Avoid kinking the capillary tubes.
 -) Using a wrench on each side of the joint tighten the connections.
 -) Replace clamp and screw that secures wiring and capillary tubes.
 -) Replacement of filter-drier.

NOTE

Whenever the refrigeration system has been opened, a new filter-drier must be installed before re-charging. (See page 5-15.)

- (8) Replace condenser fan guard (para 4-7).
- (9) Replace top panel (para 4-9).
- (10) Replace canvas cover (para 4-8).
- (11) Replace fresh air screen (para 4-10).

5-12. REFRIGERANT COMPONENTS.

The following sections contain the replacement and servicing procedures for the refrigerant components. See paragraphs 5-7 for component orientation.

5-13. REFRIGERANT TUBING.

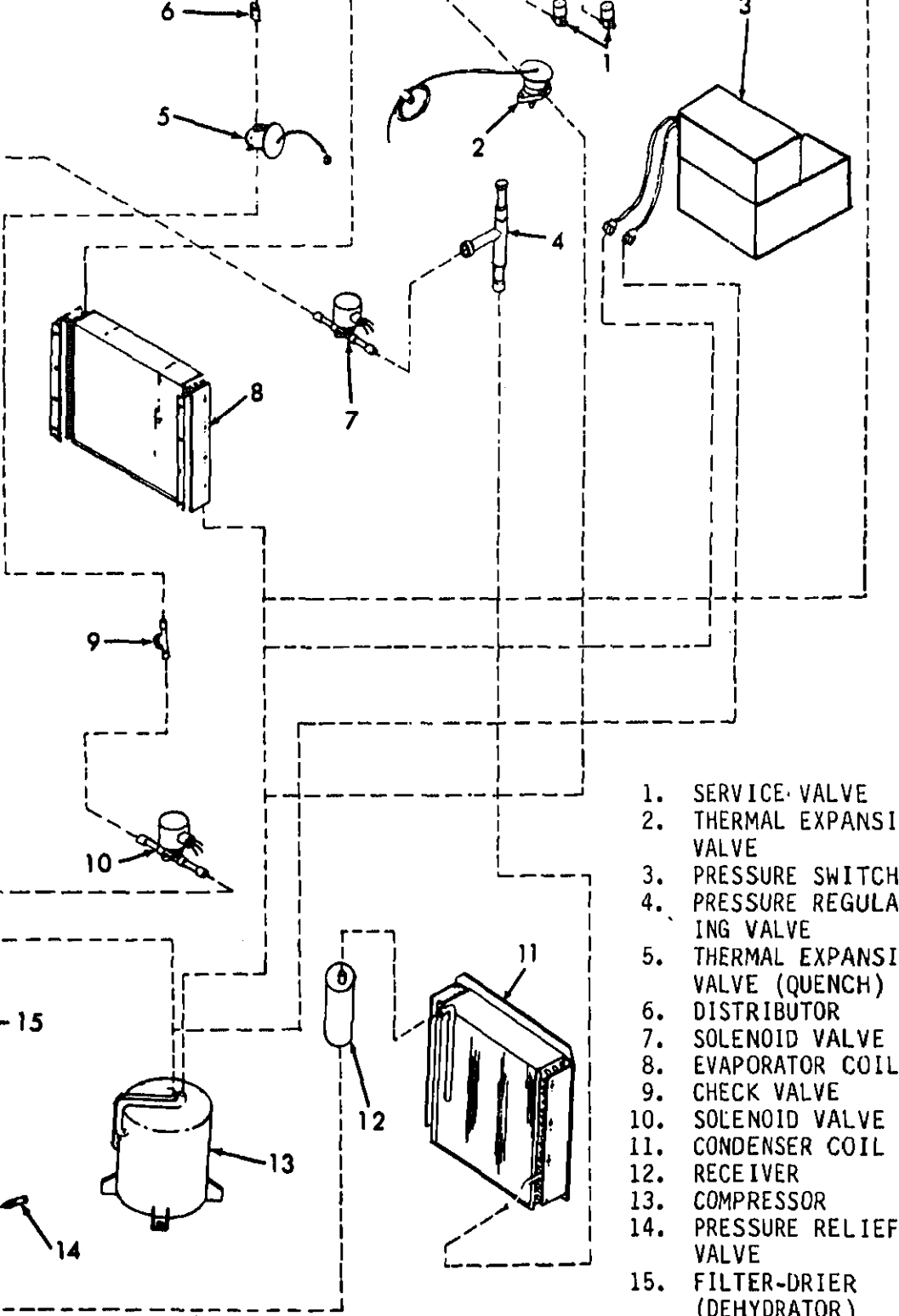
Refrigerant tubing is seamless copper which has a bright finish to permit thorough cleaning and to prevent oxidation or other impurities. Both rigid and soft tubing are used depending upon whether the tubing is to be bent or not. Sharp changes of direction are accomplished by using fittings such as elbows, tees and crosses. Connections are made by soldering or brazing, and by flare fittings.

a. Inspection/Test.

Inspect tubing and fittings usually for leaks, kinks, or damage. If damage appears to be minor (see paragraph 5-5). If no leaks are detected, the tubing is serviceable.

b. Removal/Installation.

- (1) General. The refrigeration system must be discharged before removing any pipe. De brazing is required for removal. Dry nitrogen (item 8, table E-1) must be used through the system while the joint is being removed. Any refrigerant gas in the system would cause serious damage at the de brazing temperature.
- (2) Heating. Sufficient heat should be applied around the joint to reach the melting point of the filler metal quickly. Slow or uneven heating permits heat to be conducted away from the joint, sometimes melting an adjacent joint instead of the one intended.



1. SERVICE VALVE
2. THERMAL EXPANSION VALVE
3. PRESSURE SWITCH
4. PRESSURE REGULATING VALVE
5. THERMAL EXPANSION VALVE (QUENCH)
6. DISTRIBUTOR
7. SOLENOID VALVE
8. EVAPORATOR COIL
9. CHECK VALVE
10. SOLENOID VALVE
11. CONDENSER COIL
12. RECEIVER
13. COMPRESSOR
14. PRESSURE RELIEF VALVE
15. FILTER-DRIER (DEHYDRATOR)

gloves when performing the following

- (a) Fold a piece of fiber-glass E-1) about 6 x 6 inches and the tubing, a few inches away to be cleaned.
 - (b) Heat the tubing at the end braze filler metal is thorough.
 - (c) Grasp the fiberglass wrapping over the tubing end with a
- (4) Protection from heat.

WARNING

Polyurethane foam insulation breaks toxic gases when heated to brazing temperatures.

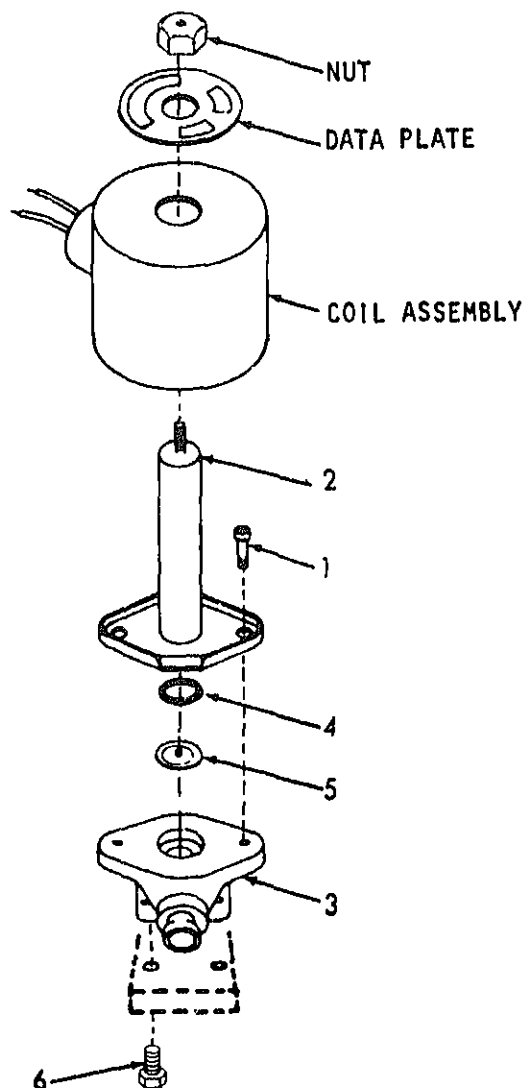
- (a) When brazing/debrazing refrigerant fittings near an insulated condenser, fabricate a shield to keep the flame of the torch away. Perform the operation in a well-ventilated area.
- (b) When brazing/debrazing tubing, valves, solenoid valves or components, they could be warped or damaged. If possible, the component should be disassembled to the extent possible, and the boiler should be disassembled. If disassembly is impractical, the entire component, except for the tubing, should be wrapped in a heat sink.

5-14. SOLENOID VALVE REPLACEMENT.

a. Description.

Two solenoid valves are used in the air conditioning system to close/open the liquid refrigerant line from the evaporator coil expansion valve, the other to the equalization circuit from the discharge side of the compressor suction side. Both valves are alike; however

(2) Solenoid testing (para 4-42.1).



removal.

If it is necessary to replace the tube and plunger assembly, O-ring, and O-ring, or the entire valve, proceed as directed in the following procedure:

(para 5-5).

- (1) Remove coil assembly as directed in paragraph 4-42.1.
- (2) When refrigerant is completely discharged from the system, remove the two screws (1) that fasten the tube and plunger assembly (2) to the body (3). Remove the tube and plunger assembly (2), O-ring (4), and diaphragm (5) and discard.
- (3) If valve body is serviceable, install replacement parts. If valve body is warped or is otherwise unserviceable, connect a cylinder of dry nitrogen to the discharge service valve, and establish a flow of (0.1 - 0.2 M³/min) through the system. Debraze the valve body from the refrigerant tubing.
- (4) Remove two mounting screws (6) attaching the valve to the mounting bracket. Remove the solenoid valve body.

Installation.

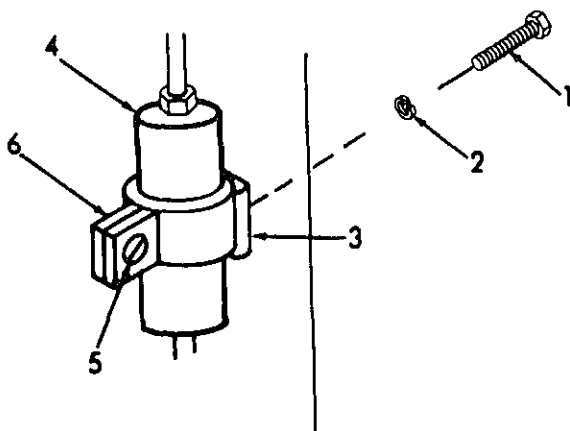
- (1) If valve body (3) was removed, install new body, attach to mounting bracket with two screws (6) and attach connections to body, disassembled from remainder of assembly.
- (2) Wrap the body between the tubing connection in wet cloth, and start a 1-2 cfm (0.1 - 0.2 M³/min) flow of dry nitrogen (item 8, table E-1) through the system. Braze connections. When cool, remove cloth and clean assembly.
- (3) Install O-ring (4) in groove in tube and plunger assembly (2) and place diaphragm (5) in recess in valve body with the metal buffer plate and seat on top.
- (4) Carefully place tube and plunger assembly (2) on valve body (3) and secure with two screws (1). Tighten uniformly.
- (5) Install coil assembly as instructed in paragraph 4-42.2.
- (6) Install a new filter-drier as per paragraph 5-15 and leak test as directed in paragraph 5-5.
- (7) Replace the components removed (para 4-42.1).

description.

The filter-drier assembly is a metal container which contains desiccating and filtering media through which the liquid refrigerant flows from the condenser coil to the evaporator coil. A filter-drier must be installed in the system whenever the system is opened. The filter-drier is located above and to the right of the compressor in the lower part of the air conditioner. It is connected to the refrigerant piping by flare nuts for easy replacement.

Preliminary Requirements.

- (1) Remove lower panel (para 4-12).
- (2) Remove junction box (para 4-28).
- (3) Remove fresh air screen (para 4-14).
- (4) Discharge system (para 5-3).



WARNING

All refrigerant gas must be discharged from the system (para 5-3) before proceeding with the re-

slide the band clamp from the filter-drier.

Installation.

- (1) Install a new filter-drier (4) in the band clamp tighten screw (5), in such a way that the direction of flow arrow will point up when installed.
- (2) Install the filter-drier and band clamp in the air conditioner, and secure with the screw (1) and washer (2) removed previously. Check again to be sure the direction-of-flow arrow is pointing up.
- (3) Connect refrigerant tubing to the flare fittings top and bottom of the filter-drier.
- (4) Leak-test in accordance with paragraph 5-5.
- (5) Replace the components removed in the preliminary requirements, items 1 and 2.
- (6) Test, evacuate, and recharge system as per paragraph 5-5 through 5-8.
- (7) Remove gauges, and replace caps on service valves.
- (8) Replace fresh air screen as per paragraph 4-14.

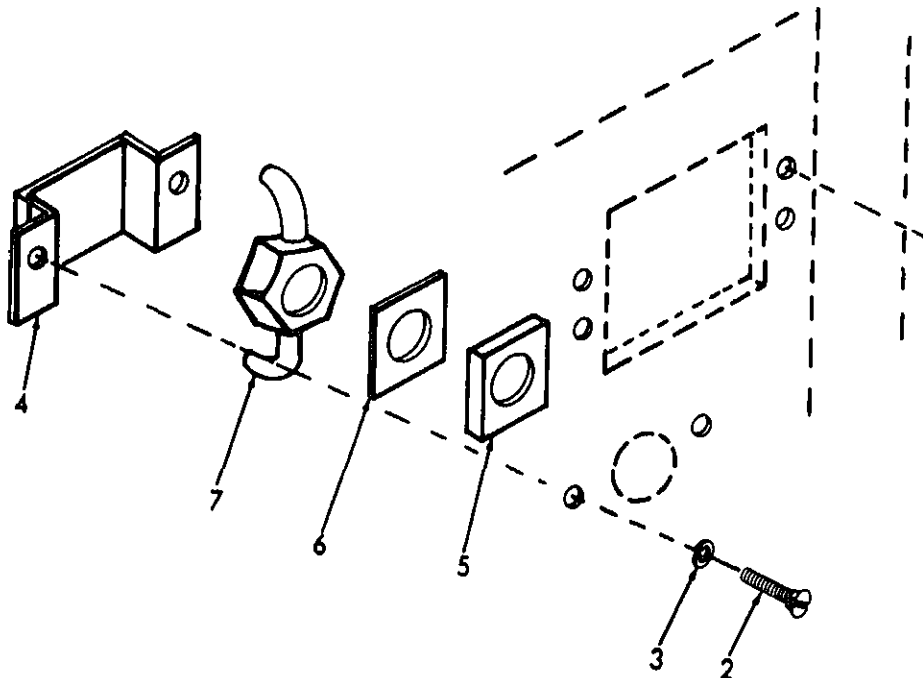
SIGHT GLASS REPLACEMENT.

Description.

The sight-glass liquid indicator is a circular sealed window on the liquid side of the system between the liquid line solenoid valve and the evaporator coil expansion valve. The indicator is located on the rear surface of the air conditioner, below the pressure cut-off switch.

Preliminary Requirements.

- (1) Remove fresh air screen (para 4-14).
- (2) System discharge (para 5-3).
- (3) Remove canvas cover (para 4-8).
- (4) Remove top panel (para 4-9).



WARNING

All refrigerant gas must be discharged from the system, and a flow of dry nitrogen connected to the discharge service valve before removing the sight-glass (para 5-3).

Removal.

- (1) Remove the four screws (1) from the ends of the switch housing, and move the housing aside to access to the sight-glass liquid indicator.
- (2) Remove two screws (2) and lockwashers (3) from sides of the bracket (4) and remove the bracket, spacer (5) and gasket (6) from inside the air conditioner.
- (3) With dry nitrogen flowing through the system, remove the joints of the sight-glass liquid indicator, remove the sight-glass (7) from inside the air conditioner.

Installation

system at 1-2 CFM (0.1-0.2 m³/min); brace sub joints to sight-glass liquid indicator.

- (4) Install new filter-drier (para 5-15).
- (5) Leak-test as directed in paragraph 5-5.
- (6) Reinstall the pressure switch housing using screw (1).
- (7) Replace the components removed in the preliminary requirements items 3 and 4.
- (8) Test, evacuate and recharge system as per paragraph 5-5 thru 5-8.
- (9) Remove gauges, and replace caps on service valves.
- (10) Replace fresh air screen as per paragraph 4-14.

7. PRESSURE REGULATING VALVE.

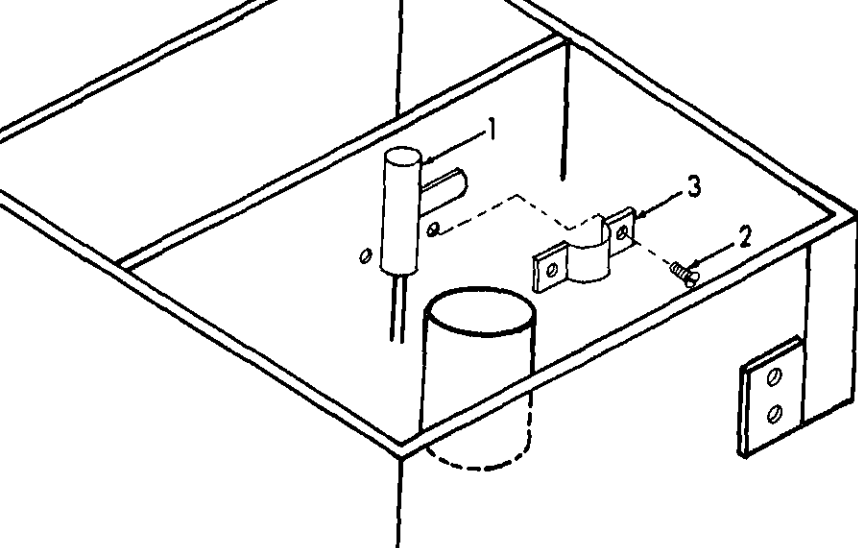
Description.

The pressure regulating valve is functionally a part of the suction circuit, and opens when suction pressure drops below a predetermined level. When the valve opens, it bypasses refrigerant gas to the suction side of the compressor to prevent the formation of low suction pressures. If pressure testing indicates that the suction pressure is below limits, adjustment of the pressure regulating valve will correct the trouble. The pressure regulating valve is located at the top of the air conditioner, in front of the pressure equalizing and liquid quench expansion valves.

Preliminary Requirements.

ADJUSTMENT

- (1) Remove canvas cover (para 4-8).
- (2) Remove top panel (para 4-9).
- (3) Remove fresh air screen (para 4-14).
- (4) Remove condenser fan guard (para 4-16).
- (5) Remove condenser fan (para 4-44.2).



/Test.

Inspect the pressure regulating valve for physical damage. Test the valve for proper operation of the valve by pressure testing in accordance with paragraph 5-8. If minimum suction pressure is below limits, adjust the pressure regulating valve.

Adjust the valve by removing the knurled screw-cap from the pressure regulating valve, and adjusting the internal screw on the suction line gauge. Turning adjustment clockwise increases the suction pressure. When the gauge indicates the proper pressure, replace the knurled screw-cap snugly on the valve.

WARNING

Refrigerant gas must be discharged from the system before removing the valve. Refer to paragraph 5-8 for discharge of system.

Connect a cylinder of dry nitrogen (item 8, table E-1) to the discharge service valve, and initiate a 1-2 cfm (0.1 - 0.2 M³/min) flow through the system.

Debrazed the two tubing joints at the pressure regulating valve. (1) (para 5.4)

Wrap valve in wet cloths to act as a heat

- (2) Install pressure regulating valve (1), bra screws (2).
- (3) Install new filter-drier (para 5-15).
- (4) Leak-test as instructed in paragraph 5-5.
- (5) Replace the components removed in the preliminary requirements.
- (6) Test, evacuate, and recharge system as per 5-5 through 5-8.
- (7) Remove gauges, and replace caps on service
- (8) Replace fresh air screen as per paragraph
- (9) Install condenser fan (para 4-44.2).
- (10) Install condenser fan guard (para 4-16)

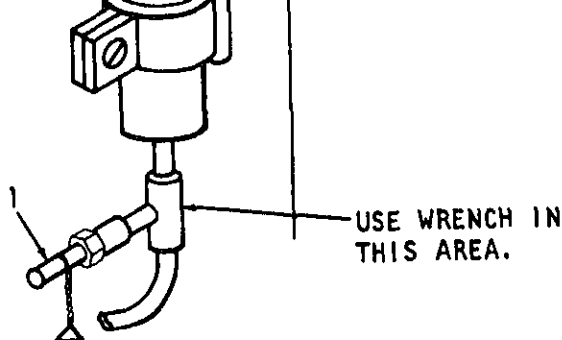
5-18. PRESSURE RELIEF VALVE.

a. Description.

The pressure relief valve is a conventional spring-valve, located on a tee fitting just below the filter-drier. The relief valve is preset at 540 ± 54 psi (38 ± 3.8 kg/cm²) and is equipped with 1/4 inch by 18 NPTF Dryseal pipe thread which can be screwed into the tee.

b. Preliminary Requirements.

- (1) Remove lower panel (para 4-12).
- (2) Remove fresh air screen (para 4-14).
- (3) Remove junction box (para 4-28).
- (4) Discharge system (para 5-3).



a1.

all refrigerant gas has been discharged from the system and remove the pressure relief valve (1). Use a back-up to prevent damage to refrigeration system tubing.

ilation.

- (1) Wrap Teflon pipe tape around the threads of the replacement pressure relief valve, and screw the valve into the tee. Use a backup wrench on the tee to prevent damage when tightening the valve.
- (2) Replace the filter-drier (para 5-15).
- (3) Leak test as per paragraph 5-5.
- (4) Replace the components removed in the preliminary requirements.
- (5) Test, evacuate, and recharge system as per paragraphs 5-5 thru 5-8.
- (6) Remove gauges and replace caps on service valves.
- (7) Replace fresh air screen as per paragraph 4-14.
- (8) Install junction box (para 4-28).
- (9) Install lower panel (para 4-12).

System service valves, pressure gauges, and vacuum gauges. The valves are connection points for pressure and vacuum gauges, for nitrogen for purging and leak-testing, and for charging refrigerant to the system.

Preliminary Requirements.

TESTING

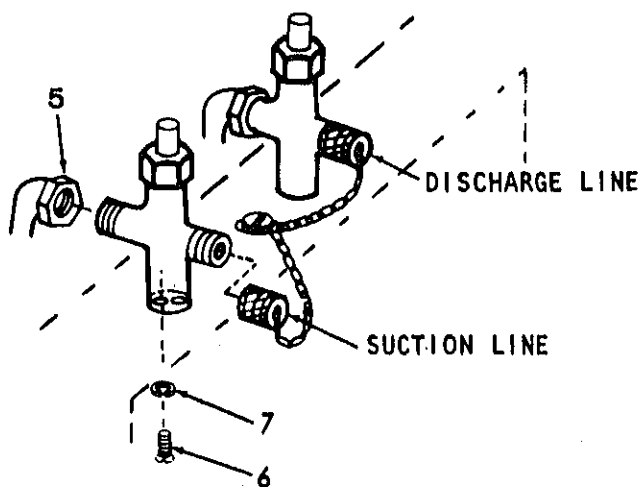
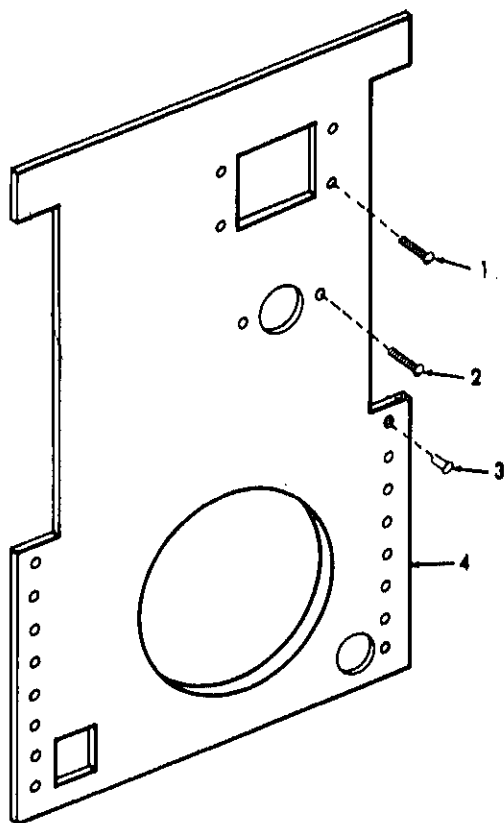
Remove fresh air screen (para 4-14).

REPLACEMENT

- (1) Discharge system (para 5-3).
- (2) Remove condenser fan guard (para 4-16).
- (3) Remove condenser fan (para 4-44.2).
- (4) Remove motor support (para 4-17).
- (5) Remove CBR cover (para 4-13).
- (6) Remove canvas cover (para 4-8).
- (7) Remove top panel (para 4-9).
- (8) Remove condenser coil guard (para 4-15).

Inspection/Test.

Visually inspect the service valves for physical damage, missing caps, and missing caps. Replace missing or broken parts or valves. Test for leaks, both with caps snugly screwed on and with caps off, in accordance with paragraph 5-5. If leaks are detected with caps off, the valves are faulty. If leaks are detected with caps on, the flare nut connections are probably faulty.



- (2) Remove screws (2) that attach sight glass to panel (4).
- (3) Drill out rivets (3).
- (4) Pry side of case outward so that panel (4) can be removed.

WARNING

Make sure that all refrigerant gas has been discharged from the system before proceeding (para 5-3).

- (5) The inner end of each service valve is connected to refrigeration piping with a flare nut (5). Disconnect by unscrewing the flare nut.
- (6) Remove two screws (6) and lock washers (7) that attach valve body to the floor of the fresh air intake chamber.

Installation.

- (1) Screw the flare nut (5) onto the connecting end of the service valve.
- (2) Install two screws (6) and lockwashers (7) in each valve body through the floor of the fresh air chamber below.
- (3) Tighten the flare nuts (5).
- (4) Replace panel (4) using rivets (3).
- (5) Replace sight glass screws (2).
- (6) Replace pressure cut-out switch screws (1).
- (7) Replace condenser fan (para 4-44.2).
- (8) Replace condenser fan guard (para 4-16).
- (9) Replace CBR panel (para 4-13).
- (10) Replace top panel (para 4-9).
- (11) Replace canvas cover (para 4-8).

- (14) Test, evacuate, and recharge the system as per p 5-5 thru 5-8.
- (15) Remove gauges and replace caps on service valves
- (16) Replace fresh air screen (para 4-14).

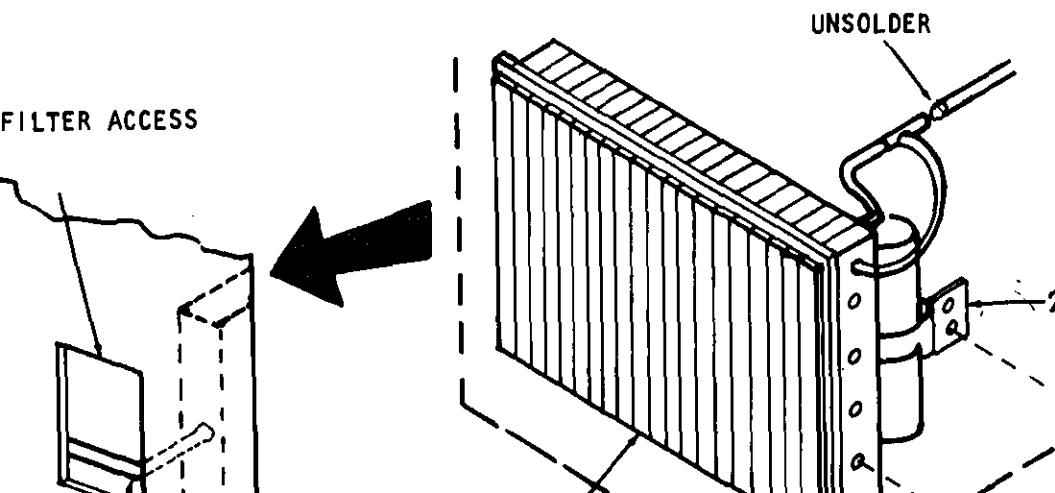
CONDENSER COIL REPLACEMENT.

cription.

e condenser coil assembly consists of two coils with a fins; the condenser coil itself, and the subcooler coil er coil assembly is located at the bottom rear section ditioner, and is covered by a grille and screen assembly. it from damage or dirt.

liminary Requirements.

- (1) Discharge system (para 5-3).
- (2) Remove canvas cover (para 4-8).
- (3) Remove condenser coil guard (para 4-15).
- (4) Remove RFI filter (para 4-39).
- (5) Debrazing (para 5-4).



- (2) Remove four screws (3) in a vertical line on each side of the casing. These screws secure the condenser (4) to the casing.
- (3) Provide a 1-2 cfm ($0.1 - 0.2 \text{ M}^3/\text{min}$) flow of dry nitrogen (item 8, table E-1) through the system discharge service valve. After three minutes of nitrogen purging, debraze the tubing as shown in this figure. It is not necessary to debraze the receiver at this time. Withdraw the condenser coil from the air conditioner.

Servicing.

(1) Cleaning

Cap or plug all openings, and tape caps or plugs to prevent accidental removal. No water must be permitted to enter the coil. When thoroughly sealed, immerse coil in a warm detergent solution for five minutes to soak loose caked-on dirt, then agitate the coil gently in the solution to remove dirt from between fins. Rinse thoroughly in clear water.

(2) Fin Alignment

If fins are bent or crushed, straighten them with a wire or plastic blade so that they are straight and parallel. Badly bent or crushed fins can cause serious disruption of airflow, resulting in inefficient operation of the air conditioner.

Installation.

NOTE

If the receiver was removed, or a new coil is being installed, install the receiver to the coil assembly and braze joints before installing the coil in the air conditioner.

- (1) Position the condenser coil (4) in the air conditioner with all tubing joints meeting properly. Secure the coil with four screws (3) through each side of the casing.
- (2) Start a flow of 1-2 cfm ($0.1 - 0.2 \text{ M}^3/\text{min}$) of dry nitrogen (item 8, table E-1) through the system discharge service valve. After three minutes of nitrogen purging, braze joints.

side of the air conditioner.

- (4) Install a new filter-drier (para 5-15).
- (5) Replace the components removed in preliminary requirements items 4 thru 2.
- (6) Test, evacuate, and recharge system as per para 5-5 thru 5-8.

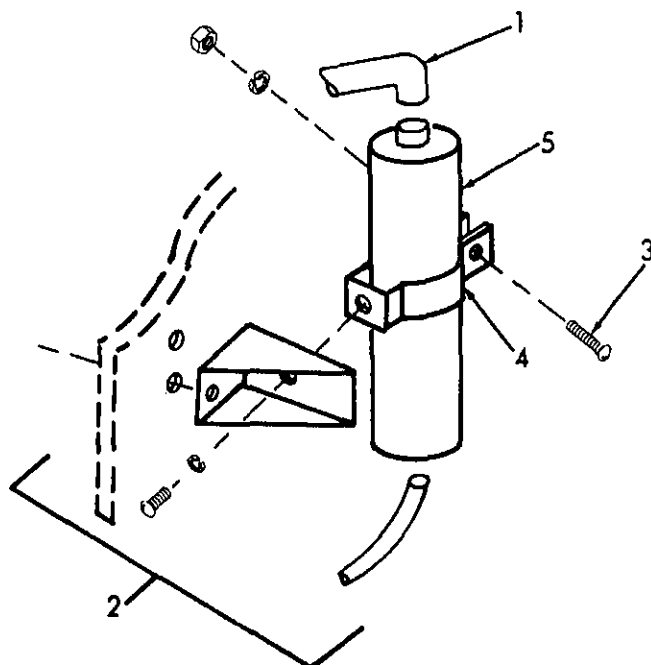
RECEIVER.

cription.

The receiver is a small cylindrical tank in the line between the condenser coil and the sub-cooler section of the condenser coil. Its function is to act as a reservoir for liquid refrigerant, which is necessary for the proper operation of the refrigeration system. The receiver is located on the left side of the air conditioner, just in front of the condenser coil.

Preliminary Requirements.

- (1) Remove condenser coil (para 5-20).
- (2) Debrazing (para 5-4).



d. Installation.

- (1) Place the receiver (5) in the band clamp, tighten the clamping screw (3) finger tight.
- (2) Make tubing connections (1) from the condenser to the receiver, and tighten the clamping screw on the band clamp (4).
- (3) Restart the flow of dry nitrogen (item 8), and braze tubing joints to the receiver.
- (4) Reinstall condenser coil (para 5-20).

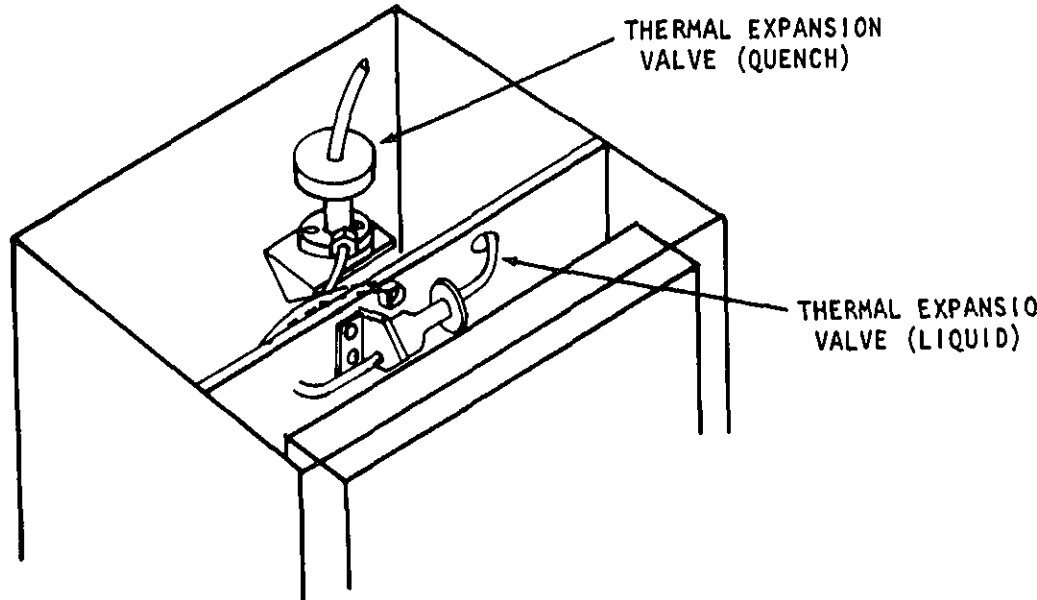
5-22. THERMAL EXPANSION VALVE.

a. Description.

Two thermal expansion valves are used in the air conditioning system. One expansion valve meters (liquid) refrigerant into the evaporator coil, through a distributor which disperses the liquid into several parts of the coil. The other expansion valve injects liquid refrigerant into the compressor suction line, to maintain the temperature of hot gas in the bypass circuit. Both valves respond to temperature changes in the refrigerant suction line. Remote bulbs are attached. The effects of pressure-drop in the evaporator coil are cancelled by a pressure equalization valve in the evaporator thermal expansion valve to the downstream (suction) side of the evaporator coil just beyond the sensing bulb. This equalization permits the valve to respond more quickly to temperature variations alone. Since pressure-drop in the liquid line is insignificant, the liquid injection expansion valve is located on the suction side externally. Both valves are hermetically sealed to the suction line, the bulbs and capillary tubes.

b. Preliminary Requirements.

- (1) Remove canvas cover (para 4-8).
- (2) Remove top panel (para 4-9).
- (3) Remove condenser fan guard (para 4-16).
- (4) Remove condenser fan (para 4-44.2).



ting.

- (1) Cut insulation away from sensing bulb and band clamp. Remove screw from band clamps, and remove sensing

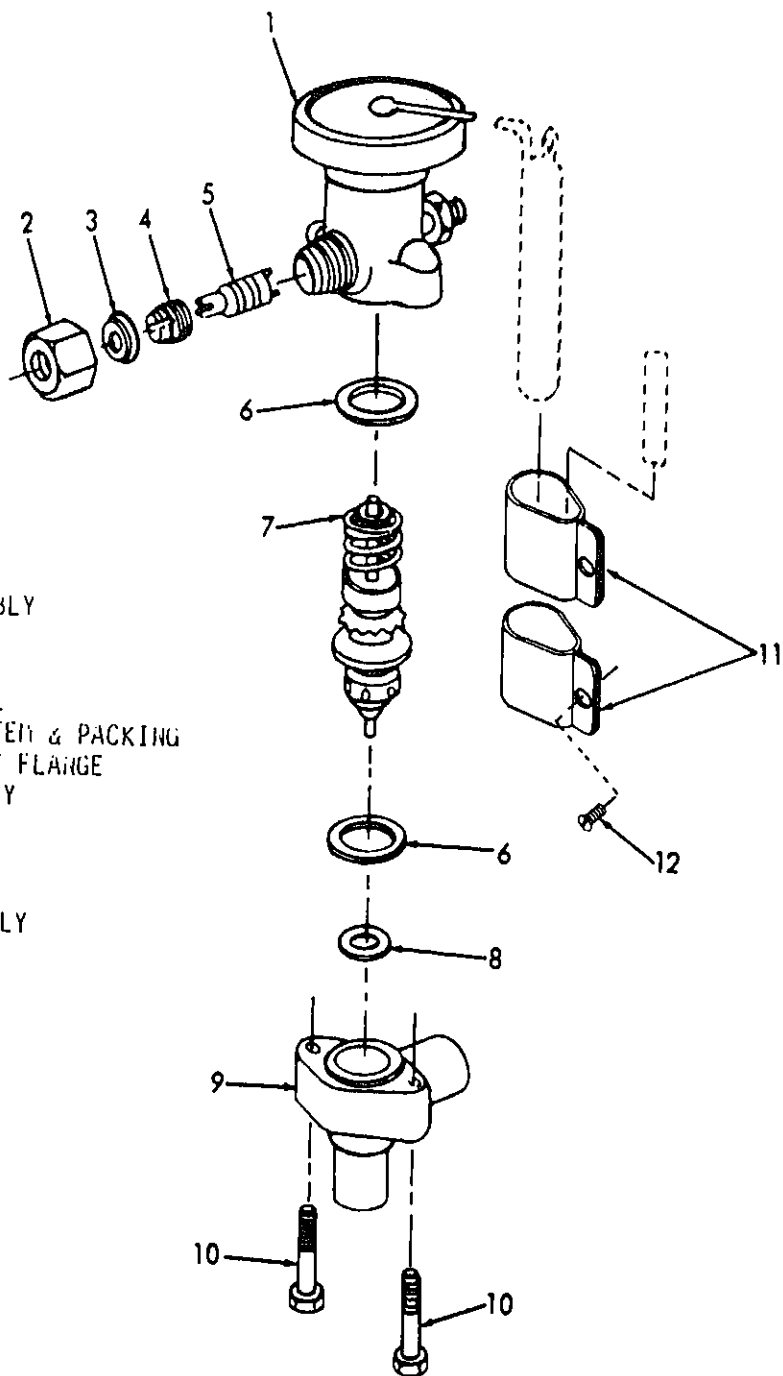
NOTE

Because the condenser fan impeller and the top panel were removed for access, the condenser coil will be without airflow. Provide temporary airflow for the following test, by placing a high velocity fan or centrifugal blower directly in front of the condenser coil, and as close to it as possible.

- (2) With the air conditioner stopped, let the suction warm up to ambient temperature.
- (3) Remove the sensing bulb from its location against suction line, and place it in a container of ice or crushed ice (32°F or 0°C). Note position of bulb on removal and be sure to replace it in the same position.

CAUTION

Do not let liquid refrigerant flood back into the



1. POWER ASSEMBLY
2. CAP, SEAL
3. BONNET SEAL
4. PACKING SEAL
5. ADJUSTING STEM & PACKING
6. GASKET, BODY FLANGE
7. CAGE ASSEMBLY
8. GASKET, SEAT
9. FLANGE, BODY
10. SCREWS, CAP
11. CLAMP ASSEMBLY
12. SCREW

feeling the suction line. If the suction line temperature drops, the valve is operating properly. Stop the air conditioner at once, and re-install the sensing bulb. If the temperature of the suction line does not drop, stop the air conditioner and replace the expansion valve.

ng Superheat.

Refrigerant gas is said to be superheated when its temperature is higher than the evaporating temperature corresponding to its pressure. When a thermal expansion valve is set for optimum operation in this case 6°F or 3.3°C above the evaporating temperature, the refrigerant (at a given pressure) the evaporator coil with maximum efficiency. That is, the refrigerant gas does not condense before reaching the end of the coil, which would reduce the cooling capacity, and the refrigerant does not remain in a liquid state after passing completely through the coil, which could result in severe damage to the compressor. The superheat setting of a thermal expansion valve can be adjusted by varying the compression spring (7) in the power assembly of the valve. The spring tends to hold the valve closed against the pressure in the liquid line and capillary tube; therefore, the greater the spring pressure, the higher the superheat. Check superheat, and adjust it in accordance with the following procedure:

1. Remove insulation from a spot on the suction line near the outlet of the thermal expansion valve to be adjusted.

2. Install an accurate thermometer or the probe of a thermocouple on the bare spot, using a small gob of thermal mastic, if necessary, to improve conductivity. Tape the thermometer bulb or thermocouple junction in position, and cover with insulating material.

3. Connect a suitable pressure gauge to the suction service valve and open the valve.

4. Operate the air conditioner in the cooling mode for about 15 minutes, observing the thermometer or thermocouple dial to see that the temperature has stabilized. When the temperature remains unchanged for at least two minutes, record the temperature and pressure.

5. Compare the recorded temperature and pressure with those listed in the Table. Each expansion valve should register higher than the value in the Table by the following amount.

Evaporator expansion valve: $6^{\circ} \pm 1.5^{\circ}\text{F}$ or $3.3^{\circ} \pm 0.8^{\circ}\text{C}$

Quench expansion valve: $30.4^{\circ} \pm 0.5^{\circ}\text{F}$ or $16.7^{\circ} \pm 0.3^{\circ}\text{C}$

Deg F	Deg C	Psig	kg/cm ²	Deg F	Deg C	P
10	-12.3	32.93	2.315	66	18.9	11
12	-11.1	34.68	2.439	68	20.0	11
14	-10.0	36.89	2.593			
16	- 8.9	38.96	2.739	70	21.1	12
18	- 7.8	41.09	2.889	72	22.2	12
				74	23.3	13
20	- 6.6	43.28	3.043	76	24.4	13
22	- 5.5	45.23	3.180	78	25.6	14
24	- 4.3	47.85	3.364			
26	- 3.4	50.24	3.532	80	26.7	14
28	- 2.2	52.70	3.705	82	27.8	14
				84	28.9	15
30	- 1.1	55.23	3.883	86	30.0	15
32	0	57.83	4.066	88	31.1	16
34	1.1	60.51	4.254			
36	2.2	63.27	4.448	90	32.2	17
38	3.3	66.11	4.648	92	33.3	17
				94	34.5	18
40	4.4	69.02	4.853	96	35.6	18
42	5.5	71.99	5.062	98	36.7	19
44	6.6	75.04	5.276			
46	7.7	78.18	5.497	100	37.8	19
48	8.8	81.40	5.723	102	38.9	20
				104	40.0	20
50	10.0	84.70	5.955	106	41.1	21
52	11.1	88.10	6.257	108	42.2	22
54	12.2	91.5	6.433			
56	13.3	95.1	6.686	110	43.3	22
58	14.5	98.8	6.947	112	44.4	23
				114	45.6	24
60	15.6	102.5	7.206	116	46.7	24
62	16.7	106.3	7.474	118	47.8	25
64	17.8	110.2	7.748			

(6) If the superheat setting is not within the limits above (higher than the values in Table 5-3), adjust the expansion valve as follows:

(a) Remove the hexagonal seal cap (2) from the side power assembly (1), and loosen the bonnet seal (3).

(b) Turn the adjusting stem (5) two complete turns superheat of one degree F. Turn clockwise to raise, and counter-clockwise to lower, the superheat setting. Do not turn more than

...e, and replace the insulating material. Close the suction valve, remove the pressure gauge, and install the cap on the valve gauge port.

1.

- 1) Discharge system (para 5-3).
- 2) Remove insulation and band clamp from sensing bulb. Carefully detach bulb and capillary tube.
- 3) Remove two capscrews (10) securing the power assembly (1) to the valve body (9). Remove the power assembly capillary tube and sensing bulb.
- 4) Detach equalizer line, on liquid expansion valve. Not applicable to quench valve.

CAUTION

Maintain a 1-2 cfm (0.1 - 0.2M³/min) flow of dry nitrogen (item 8, table E-1) through the refrigeration system to prevent oxidation and scaling when brazing or debrazing components.

- 5) Debraze (para 5-4).
- 6) Remove valve body (9).

lation.

- 1) Disassemble the new valve by removing two capscrews that secure the power assembly (1) to the valve body (9), and separate the two.
- 2) With dry nitrogen (item 8, table E-1) flowing through the refrigeration system braze tubing joints. Let cool. Tighten capscrew.
- 3) Install the valve body in the support bracket, and secure with two capscrews (10), finger tight. Connect tubing.
- 4) Install power assembly (1) on valve body, being careful to fit lugs on the cage assembly (7) into the cavity in the body (9). Secure with two capscrews (10). Connect equalizer line, on liquid expansion valve.

suction line. Clamp in position to the suction line. Cover suction line, sensing bulb and clamp with insulating material.

- (7) Carefully form the capillary tube along adjacent surface and tape to support.
- (8) Leak-test in accordance with paragraph 5-5.
- (9) Replace filter-drier (para 5-15).
- (10) Test, evacuate, and recharge system as per paragraph 5-5 thru 5-8.
- (11) Reinstall components removed in the preliminary requirements.
- (12) Remove gauges and replace caps on service valves.
- (13) Replace fresh air screen (para 4-14).

23. EVAPORATOR COIL REPLACEMENT.

Description.

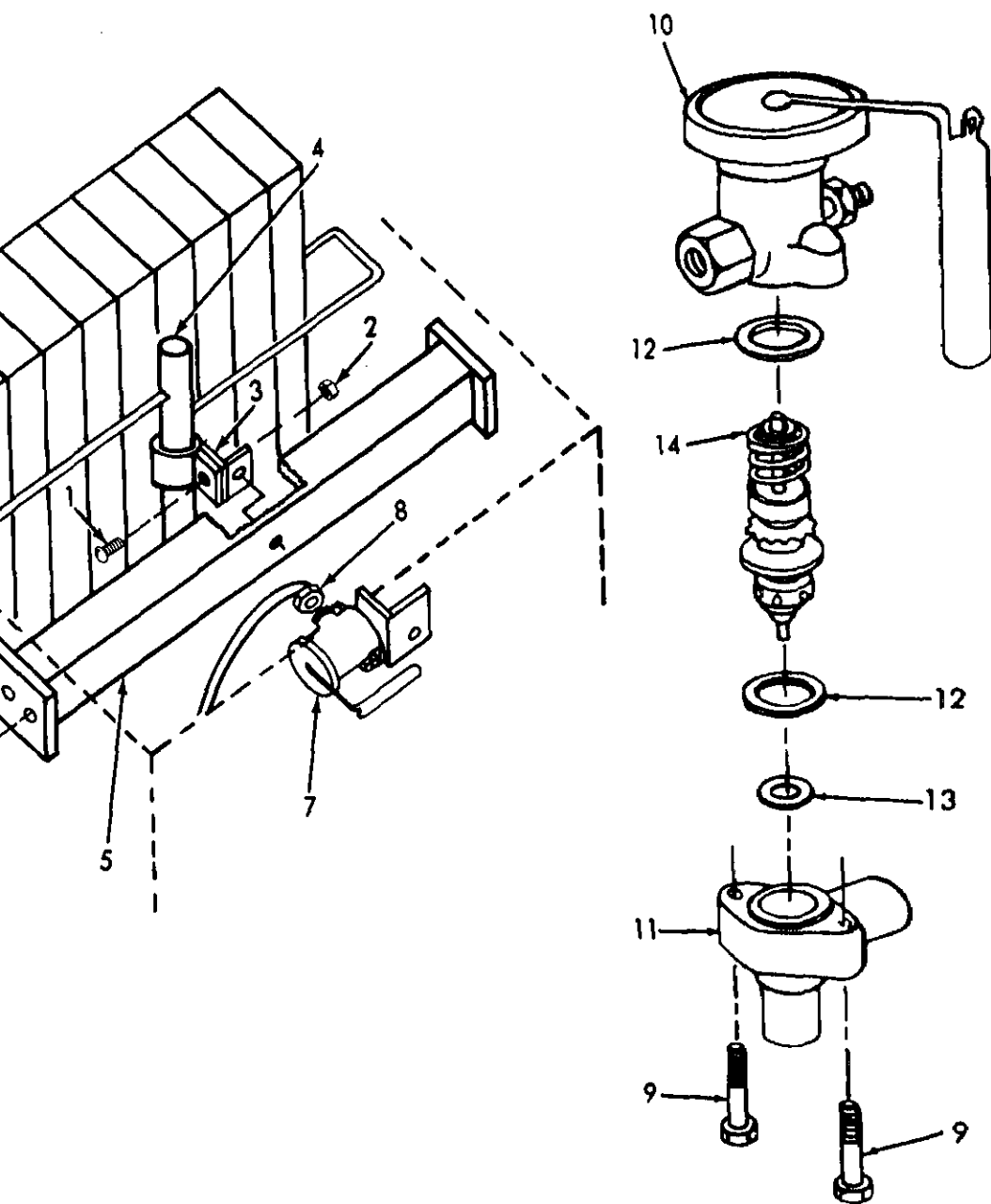
The evaporator coil receives liquid refrigerant from the expansion valve, and evaporates the liquid to a gas by absorbing heat from the airflow passing over the outside surface of the coil. The evaporator coil is located in the top front section of the air conditioning unit.

Preliminary Requirements.

- (1) Remove canvas cover (para 4-8).
- (2) Remove top panel (para 4-9).
- (3) Remove air discharge grille (para 4-10).
- (4) Remove mist eliminator (para 4-20).
- (5) Remove heating elements (para 4-43.1).
- (6) Remove condenser fan guard (para 4-16).
- (7) Remove condenser fan (para 4-44.2).
- (8) Remove air intake grille (para 4-11).
- (9) Remove air intake filter (para 4-18).

1) Discharge system (para 5-3).

2) Debraze (para 5-4).

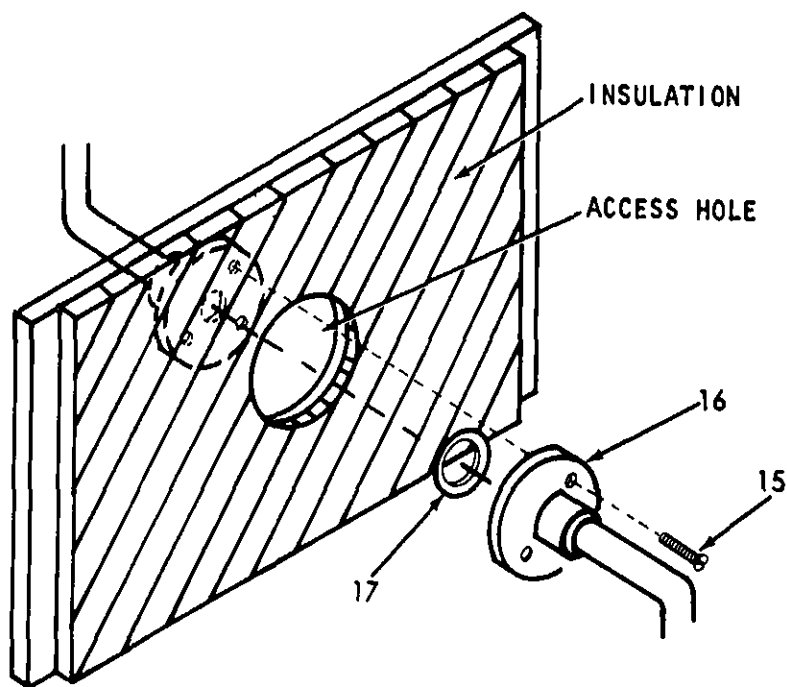


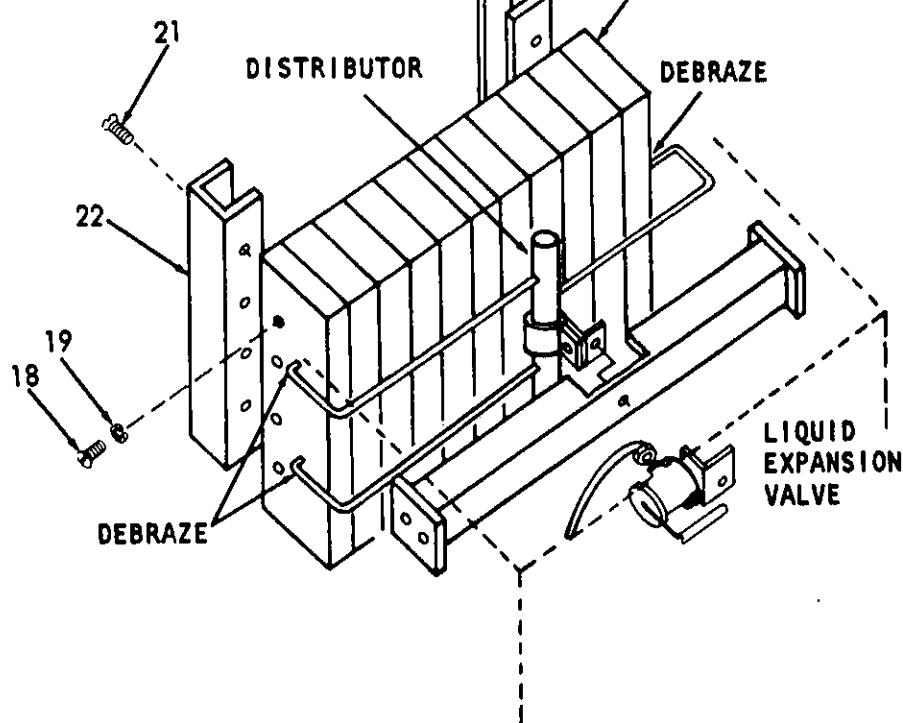
11.

1) Remove screw (1) and nut (2) that attaches clamp pipe (4).

valve body at this time.

- (a) Unscrew the equalizer tube flare nut (8) from the power assembly of the valve.
 - (b) Remove two mounting screws (9), from the bracket and valve body. Carefully separate the power assembly (10) from the valve body (11), and remove gaskets (12 and 13) and cage assembly (14).
 - (c) Provide a flow of 1-2 cfm (0.1 - 0.2 M³/min) of dry nitrogen (item 8, table E-1) through the system from the discharge service valve for at least 10 minutes, then debraze the liquid line from the expansion valve.
- (4) Remove condenser fan baffle if required (see para 4-1).
 - (5) Accessing through the condenser fan, remove insulation around flange.
 - (6) Remove three capscrews (15) from the rear of the suction line flange connection (16) and separate the two halves of the flange connection slightly. Remove and discard the O-ring (17).





ving.

Cleaning

Cap or plug all openings, and tape caps or plugs to prevent accidental removal. No water must be permitted to enter the coil. When thoroughly sealed, immerse the coil in warm detergent solution for five minutes to soak loose caked-on dirt, then agitate the coil vigorously in the solution to remove dirt from between the fins. Rinse thoroughly in clean water.

Fin Alignment

If fins are bent or crushed, straighten them with a wooden block and a plastic blade so that they are straight and parallel. Bent or crushed fins can cause serious distortion of the coil, resulting in inefficient operation of the air conditioning system.

assembly.

If a new coil is to be installed, debraze the distributor assembly from the old coil at three places. Remove the distributor retainer channels (22) from the coil by removing the four screws (21) from each channel.

- 3011.
- (4) Place evaporator coil (20) in position.
 - (5) Install a new O-ring (17) in the groove of the suction line connecting flange (16) and assemble the halves of the flange. Secure with three capscrews (15) from back of the partition. Replace insulation.

NOTE

If a new liquid line expansion valve body is to be installed, braze the distributor body into the discharge port of the expansion valve before assembling the valve.

- (6) Position the liquid line expansion valve body (11) with its support bracket, and align by securing with two screws (9) and slave nuts. Do not install power assembly at this time. Braze liquid line to valve body.
- (7) Install new gaskets (12) and seat (13) in valve body.
- (8) Place cage assembly (14) in power assembly (10), secure with screws (9) and fit bosses of cage assembly into recesses in valve body. Secure power assembly (10) to valve body (11) with screws (9). Connect the equalizer line to the nut.
- (9) Install screws (18) and washers (19) that secure evaporator coil (20) to air conditioner.
- (10) Install evaporator fan (para 4-44.1).
- (11) Install condenser fan (para 4-44.2).
- (12) Install air intake filter (para 4-18).
- (13) Install air intake grille (para 4-11).
- (14) Install heater mounting bracket (5) using rivets.
- (15) Install clamp (3) to pipe (4) using screw (1) and nut (2).
- (16) Install heating elements (para 4-43.1).
- (17) Install a new filter-drier (para 5-15).

- (20) Install the mist eliminator by sliding it straight in the channels in front of the evaporator coil. sure that TOP mark is up, and that airflow arrows outward (refer to para 4-20).
- (21) Replace components removed in preliminary requirem items 3, 2, 1.

ERAL.

chapter is for the use of general support maintenance personnel. This chapter contains maintenance procedures for the casing assembly.

Section II. MAINTENANCE PROCEDURES

ING ASSEMBLY.

ption.

casing assembly supports or surrounds all functional components of the air conditioner. Therefore, if damage is extensive enough to require replacement of the casing assembly, it is also enough to have caused significant damage to major components. In case it is necessary to procure a new casing assembly, and to replace the damaged unit completely, test all components, and replace unserviceable components in the new casing. Unserviceable components must be replaced.

ction.

Inspect the casing assembly for dents, gouges, cuts or tears, and corrosion. Remove panels as necessary to determine whether internal components such as coils, wiring, piping or other components have been damaged. If damage is apparent, leak-test the refrigeration system and make an operating check of the unit and functional components. If the unit is functionally sound, repair the casing.

.

Repair dents by using a sheet-metal hammer and back-up block to avoid stretching the metal more than necessary. Fill with body putty, fiberglass-epoxy filler, or weld. Weld if possible, or fabricate a patch and attach it with blind rivets. Sand paint to a feather edge around the repair, and paint with TM 43-0139.

Inspection.

Inspect insulation for areas of looseness or separation from panel, and for missing areas. Replace damaged or missing insulation.

Removal.

WARNING

Acetone (item 1, table E-1) and methyl-ethyl ketone (MEK) (item 7, table E-1) are flammable, and their vapors are explosive. Prolonged or repeated inhalation of fumes or contact with the skin can be toxic. Use in a well ventilated area, wear gloves, and keep away from sparks or flame.

Scrape or pull off as much of the damaged insulation as possible. Then the remaining insulation and adhesive with acetone or MEK (item 1 or 7, table E-1) and remove with a putty knife, paint scraper, or similar tool. Repeat the softening and scraping process as needed, then clean up the metal surface with a cloth moistened with acetone or MEK.

Installation.

Cut a sheet of the proper insulating material to the correct size, and coat the attaching side with adhesive (item 2, table E-1) using a brush to ensure complete coverage. Also, brush adhesive on the metal to which the insulation is to be attached. Let both surfaces air-dry until the adhesive becomes tacky but will not stick to the fingers. Starting at one corner or at a narrow edge, gradually and fully bring the insulation into full contact with the metal surface, pressing it into firm contact all over.

5-4200-200-10

Hand Portable Fire Extinguisher
for Army Users.

PAINTING

43-0139

Painting Instructions for Field
Use.

MAINTENANCE

38-750

5-764

Army Equipment Record Procedure
Electric Motor and Generator
Repair.

5-4120-344-24P

Organizational, Direct Support
General Support Maintenance
Repair Parts and Special Tool
List.

EQUIPMENT AND STORAGE

740-90-1

Administrative Storage of Equipment.

DESTRUCTION OF ARMY EQUIPMENT

750-244-3

Procedures for Destruction of
Equipment to Prevent Enemy Use.

Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition items. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is transferred between property accounts. Illustrations are provided to assist you in identifying the items.

Section III. Basic Issue Items. These are the minimum items required to place the air conditioner in operation, maintain, and to perform emergency repairs. Although shipped separately, BII must be with the air conditioner during transportation and whenever it is transferred between property accounts. Illustrations will assist you with hard-to-identify items. This is your authority to request/requisition replacement BII, based on the authorization of the end item.

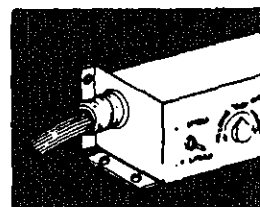
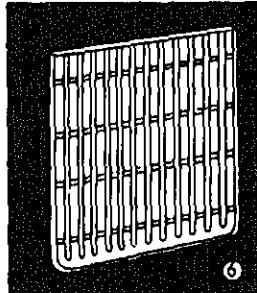
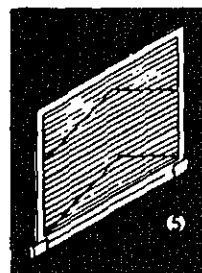
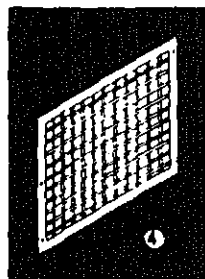
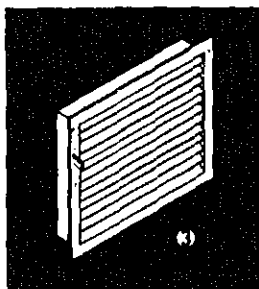
EXPLANATION OF COLUMNS.

The following provides an explanation of columns found in the listings:

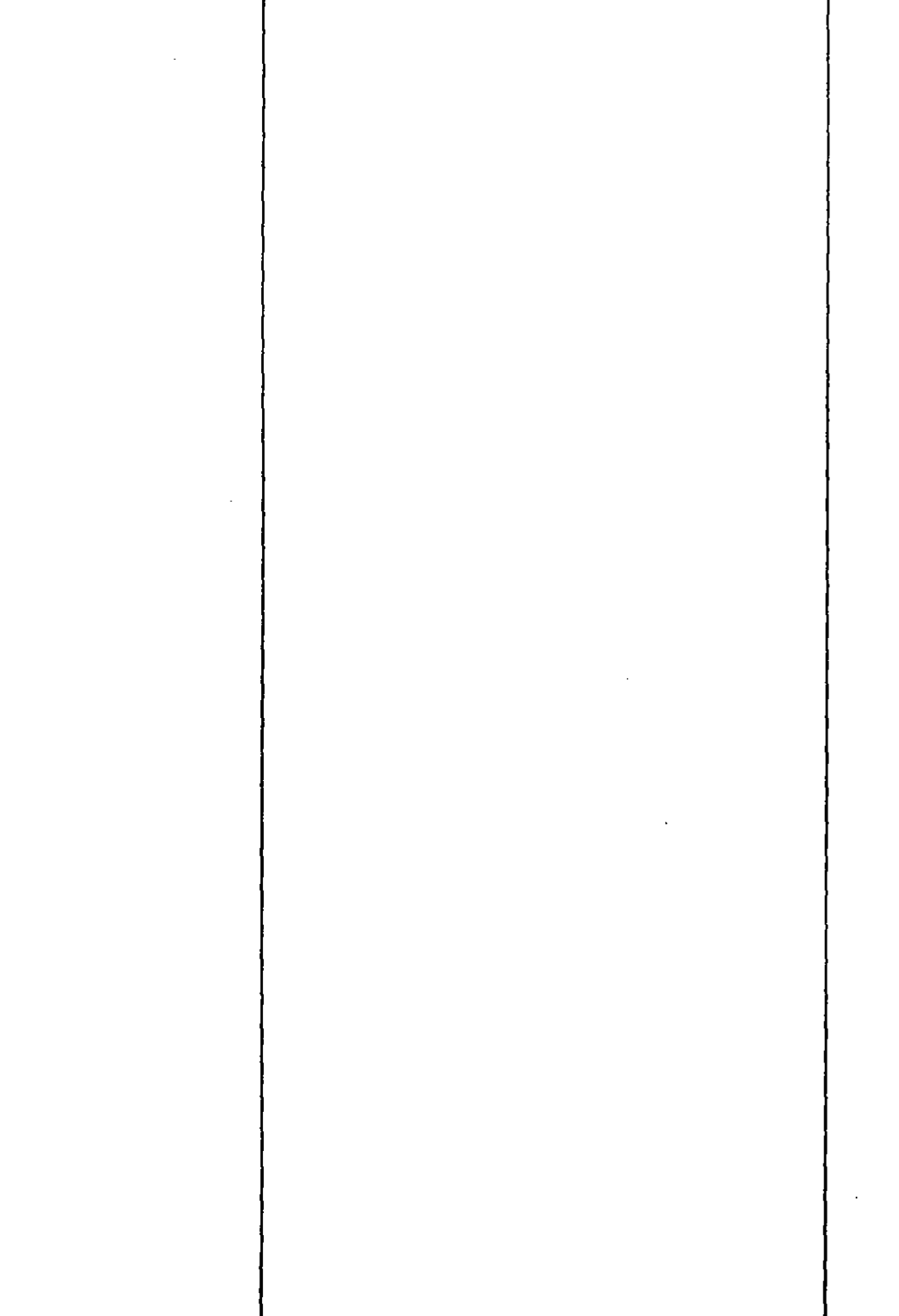
Column (1) - Illustration Number (Illus Number). This indicates the number of the illustration in which the item is located.

Column (2) - National Stock Number. Indicates the National Stock Number assigned to the item and will be used for requisitioning.

Column (3) - Description. Indicates the National item number required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) and the part number.



(1) SER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM and PART NUMBER	(4) U
	4130-01-051-7425	Cover, Air Conditioner (97403) 13217E2346	
	5935-00-846-2328	Connector, Plug, Electrical (96906) MS3106R22-22S	
	4130-01-047-8362	Grille Assy, Intake (97403) 13215E9857	
	4120-01-054-6534	Grille Assy Discharge (97403) 13215E9857	
	4130-01-011-1217	Mist Eliminator (97403) 13219E2647	
		Guard, Condenser (97403) 13215E9867	



Section I. INTRODUCTION

eral

This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. It also indicates the work measurement time required to perform the functions by maintenance level. The implementation of the maintenance functions upon the end item or components will be consistent with the maintenance functions.

Section III lists the tools and test equipment required to perform the maintenance function as referenced from Section II (Not applicable).

EXPLANATION OF COLUMNS IN SECTION II.

Column (1), Group Number. Column 1 lists group numbers for related components, assemblies, subassemblies, and modules in the next higher assembly. The applicable groups are listed in the disassembly sequence beginning with the first group.

Column (2), Component/Assembly. This column contains the identification of components, assemblies, subassemblies, and modules for which maintenance is authorized.

Column (3), Maintenance Functions. This column lists the functions to be performed on the item listed in Column 2. The maintenance functions are defined as follows:

(1) Inspect. To determine serviceability of an item by checking its physical, mechanical, or electrical characteristics against prescribed standards through examination.

(2) Test. To verify serviceability and to detect in-service failure by measuring the mechanical or electrical characteristics of an item, and comparing those characteristics with prescribed standards.

(3) Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to lubricate, to drain, to paint, or to replenish fuel, lubricants,

(5) Align. To adjust specified variable elements to bring about optimum or desired performance.

(6) Calibrate. To determine and cause correction or to be adjusted on instruments or test measuring and equipments used in precision measurement. Consist of comparison of instruments, one of which is a certified standard of known accuracy to detect and adjust any discrepancy in the accuracy of the instrument being compared.

(7) Install. The act of emplacing, seating, or positioning an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

(8) Replace. The act of substituting a serviceable part, subassembly or module (component or assembly) for an unserviceable counterpart.

(9) Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, or replace) or other maintenance actions (welding, grinding, riveting, strapping, facing, remachining or resurfacing) to restore serviceability of an item by correcting specific damage, fault, malfunction, or defect of a part, subassembly, module (component or assembly), end item, or system.

(10) Overhaul. That maintenance effort (service) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards in appropriate technical manuals. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

(11) Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with organizational manufacturing standards. Rebuild is the highest degree of material maintenance applied to equipment. The rebuild operation includes the act of returning equipment to those age measurements (hours/miles, etc.) considered in the original Army equipments/components.

d. Column (4), Maintenance Level. This column is made up of subcolumns for each category of maintenance. Work time figures are listed in these subcolumns for the lowest level of maintenance authorized to perform the function listed in Column 3. These figures indicate the average active time required to perform the maintenance action at the indicated category of maintenance under typical operating conditions.

Column (6), Remarks. Not Applicable

Column (6), Remarks. Not Applicable

ANATION OF COLUMNS IN SECTION III.

Column (1), Reference Code. The tool and test equipment code correlates with a maintenance function on the identified item or component.

Column (2), Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

Column (3), Nomenclature. Name or identification of the test equipment.

Column (4), National/NATO Stock Number. The National or NATO stock number of the tool or test equipment.

Column (5), Tool Number. The manufacturer's part number

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	REMARKS
			C	O	F	H	D		
01	CASING AND RELATED PARTS								
	Canvas Cover	Inspect	0.1						
		Install	0.1						
		Replace		0.2					
	Top Panel Assembly	Replace		0.3					
	Gasket	Replace		1.3					
	Insulation	Replace		1.3					
	Air Discharge Grille	Inspect		0.1					
		Service		0.1					
		Replace		0.2					
		Repair		0.3					
	Gasket	Replace		1.3					
	Air Intake Grille	Inspect		0.1					
		Service		0.1					
		Replace		0.2					
	Gasket	Replace		1.3					
	Lower Panel	Replace		0.2					
		Repair		1.3					
	Gasket	Inspect		0.1					
		Replace		1.3					
	Insulation	Inspect		0.1					
		Replace		1.3					
	CBR Cover	Replace		0.1					
	Fresh Air Screen	Inspect		0.1					
		Service		0.2					
		Replace		0.2					
	Condenser Coil Guard	Inspect		0.1					
		Service		0.2					
		Replace		0.2					

*Subcolumns are follows: C - Operator/Crew; O - Organizational
F - Direct Support H - General Support D - Depot

**Indicates WT/MH Required.

CASING AND RELATED
PARTS (continued)

Condenser Fan Guard	Inspect	0.1			
	Service	0.1			
	Replace	0.2			
Motor Support	Replace	3.0			
Air Filter	Inspect	0.1			
	Service	0.2			
	Replace	0.1			
Fresh Air Damper Control	Inspect	0.1	0.1		
	Adjust				
	Replace	0.5			
	Repair	1.0			
Mist Eliminator	Inspect	0.3			
	Service	0.4			
	Replace	0.4			
Block-off Panel	Install	0.5			
Instruction Plates					
	Replace	1.0			
Casing Assembly Insulation	Inspect	0.1			
	Replace			8.0	
Drip Pan Assembly	Inspect	0.1			
	Service	0.3			
Lower Drain Tube Assembly	Inspect	0.1			
	Service	0.3			
	Repair	0.4			

*Subcolumns are as follows:
F - Direct Support

C - Operator/Crew
H - General Support

O - Organizational
D - Depot

**Indicates WT/MH Required.

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	REMARKS
			C	O	F	H	D		
02	CONTROL PANEL AND JUNCTION BOX								
	Rotary Selector Switch	Test Replace		0.4 0.5					
	Temperature Con- trol and ther- mostat	Test Replace		0.4 0.5					
	Two Speed Fan Switch	Test Replace		0.4 0.5					
	Fuse Replacement	Test Replace		0.2 0.2					
	Circuit Breaker	Test Replace		0.4 0.5					
	Heater Motor Relay	Test Replace		0.4 0.5					
	Compressor Motor Relay	Test Replace		0.4 0.5					
	Time Delay Relay	Test Replace		0.4 0.5					
	Relay Armature	Test Replace		0.4 0.5					
	Transformer	Test Replace		0.4 0.5					
	Terminal Boards	Inspect Replace		0.4 0.5					
	Electrical Receptacles	Inspect Replace		0.5 1.0					
*Subcolumns are as follows:		C - Operator/Crew			U - Organizational				
F - Direct Support		H - General Support			D - Depot				
**Indicates WT/MH Required.									

(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
		C	O	F	H	D		
Rectifier Assy	Test Replace		0.4 0.5					
RFI Filter Assembly	Test Replace		1.0 1.3					
COMPRESSOR ASSEMBLY								
Compressor	Test Replace		0.4	8.0				
Compressor Crankcase Heater	Test Replace		0.4 0.5					
PRESSURE SWITCHES								
High and Low Pres- sure Cut-Out Switches	Test Replace		0.4	4.3				
Pressure Control Switch	Test Replace		0.5	4.3				
REFRIGERANT COMPONENTS								
Refrigerant Tubing and Fittings	Inspect Test Replace			0.2 1.0 4.3				
Solenoid Valves	Test Replace		0.4	4.3				
Coil	Test Replace		0.4 0.5					
Filter-drier (Dehydrator)	Replace			4.0				
Columns are as follows: F Direct Support	C - Operator/Crew H - General Support			0	Organizational D - Depot			
icates WT/MH Required.								

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	REM	
			C	O	F	H	D			
05	REFRIGERANT COMPONENTS - continued									
	Sight-glass Liquid Indicator	Inspect Replace		0.1	5.0					
	Pressure Regulating Valve	Adjust Replace			2.0 4.3					
	Pressure Relief Valve	Replace			4.3					
	Service Valves	Inspect Replace			0.2 4.3					
	Receiver	Replace			4.5					
	Thermal Expansion Valves	Test Adjust Replace			2.0 2.0 4.5					
	Condenser Coil	Service Replace		1.3	8.0					
	Evaporator Coil	Service Replace		1.3	8.0					
	06	HEATER ASSEMBLY								
Electrical Heating Elements		Test Replace		1.5 2.0						
Heater Thermostatic Switch		Test Replace		0.5 1.0						
*Subcolumns are as follows:		C - Operator/Crew		O - Organizational						
F - Direct Support		H - General Support		D - Depot						
**Indicates WT/MM Required.										

(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
		C	O	F	H	D		
FANS AND MOTORS								
Evaporator Fan Assembly	Inspect		0.4					
	Replace		2.0					
Condenser Fan Assembly	Inspect		0.4					
	Replace		2.0					
Fan Motor	Inspect		0.3					
	Test		0.4					
	Replace		2.0					
	Repair		3.5					
WIRING HARNESS								
Wiring Harnesses	Inspect		0.4					
	Test		0.5					
	Replace		1.3					
	Repair		1.5					
Wire Leads	Inspect		0.2					
	Test		0.3					
	Replace		1.0					
	Repair		1.0					
Receptacle Connectors	Inspect		0.2					
	Test		0.3					
	Replace		1.3					
Plug Connectors	Inspect		0.2					
	Test		0.3					
	Replace		1.3					
Columns are as follows: - Direct Support ates WT/MH Required.		C - Operator/Crew H - General Support		O - Organizational D - Depot				

No special tools and test equipmenet required. Standard tools and test equipment in the following kits are adequate to accomplish the maintenance functions listed in Section 11.

F

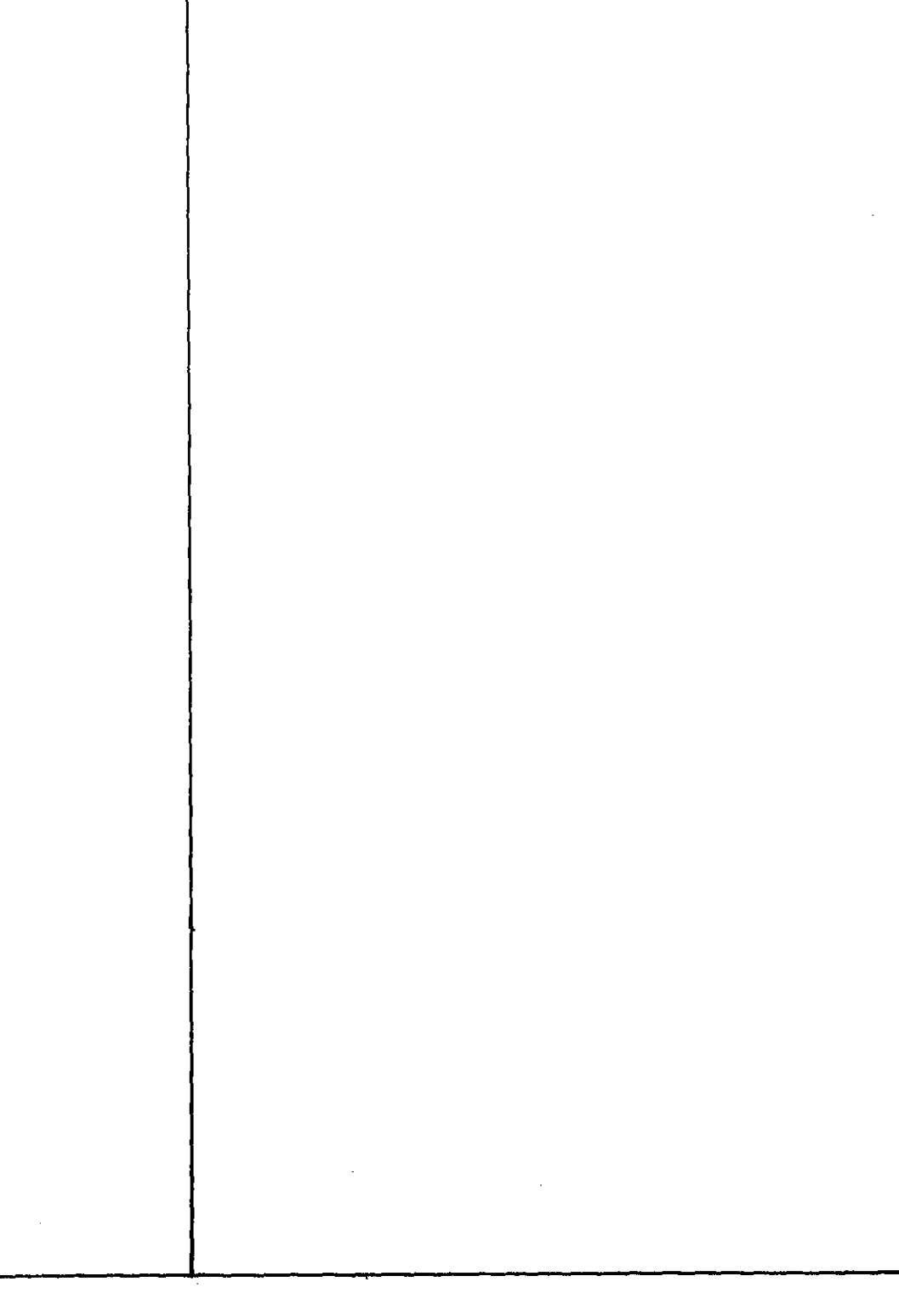
Tool kit, service, refrigeration unit (SC 5180-90-CL-N18)

5180-00-597-1474

O

Soldering Gun Kit

3439-00-930-1638



SCOPE.

This appendix list additional items you are authorized for use of the air conditioner.

GENERAL.

This list identifies items that do not have to accompany the air conditioner and that do not have to be turned in with it. Items are authorized to you by CTA, MTOE, TDA or JTA.

EXPLANATION OF LISTING

National stock number, description, and quantities are provided. When you identify and request the additional items you require, specify this equipment. "Usable On " codes are identified as follows:

CODE

USED ON

Not Applicable

Section 11. ADDITIONAL AUTHORIZATION LIST

Not Applicable

Section I. INTRODUCTION

OPE.

is appendix lists expendable supplies and materials you will need to operate and maintain the air conditioner.

These items are authorized to you by CTA 50-970, Expendable Supplies (except Medical, Class V, Repair Parts and Heraldic Items).

EXPLANATION OF COLUMNS

Column 1, Item Number. This number is assigned to the item in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5,

Column 2, Level. This column identifies the lowest level of maintenance that requires the listed item.

- C - Operator/Crew
- O - Organizational Maintenance
- F - Direct Support Maintenance
- H - General Support Maintenance

Column 3, National Stock Number. This is the National Stock Number assigned to the item; use it to request or requisition the item.

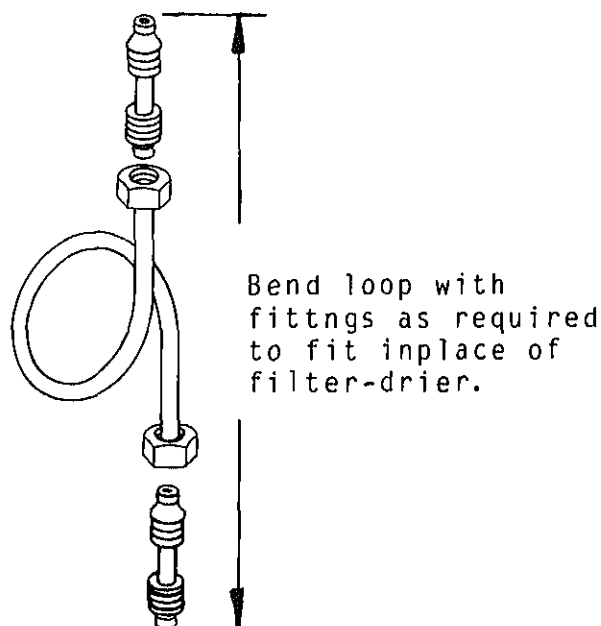
Column 4, Description. Indicates the Federal item name and, if required, a description to identify the item. The last four characters of the item indicates the part number followed by the Federal Supply Code for Manufacturers (FSCM) in parenthesis, if applicable.

Column 5, Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is indicated by a two-character alphabetical abbreviation (e.g., ea, for each). If the unit of measure differs from the unit of issue, request the lowest unit of issue that will satisfy your requirements.

BER	LEVEL	NUMBER	
	H	8040-00- 664-4318	ACETONE
	F,H		ADHESIVE Type MMM-A-1617 Type II
	U,F		DRY CLEANING SOLUTION (PD- 680)
	F	4130-00- 860-0042	FIBERGLASS CLOTH
	F		FILTER-KOTE
	F		INSULATING TAPE
	H		METHYL-ETHYL-KETONE (MEK)
	F		NITROGEN (Dry)
	F		OIL (MIL SPEC O- 2104)
	F		REFRIGERANT (R11)
	F		REFRIGERANT (R22)
	F		SOLDER (Spec QQ-S-571)

ized to be manufactured or fabricated at the direct support
enance.

All bulk materials needed for manufacture of an item is
part number or specification number on the illustration.



otes:

1. Dimensions in () are centimeters.
2. Fabricate from one foot of tube, copper, seamless ASTM-B-280-3/8.
3. Use two 3/8 copper male fittings.

Figure F-1. Filter-Dryer By-Pass Assembly.

e wiring diagram for the air conditioner is shown in Fig

FRIGERANT SYSTEM DIAGRAM

e refrigerant system diagram for the air conditioner is
e F0-2.

condense into high pressure liquid refrigerant.

SE HEATER - Prevents migration of liquid refrigerant into compressor in cold weather.

TUR - Cools and dehumidify air before it enters the room.

DRIER - Removes any traces of moisture from the refrigerant system.

- Provides heat during cold weather operation.

ESSURE CUTOUT - Interrupts power to the compressor when refrigerant system pressure becomes too high.

LINE SOLENOID - Opens or closes the liquid refrigerant line from the condenser coil to the evaporator coil expansion valve.

THERMAL EXPANSION VALVE - Injects liquid refrigerant into recirculating gas in the bypass circuit to maintain temperature of the gas below its extreme limit.

SSURE CUTOUT - Interrupts power to the compressor when refrigerant system pressure becomes too low.

E CONTROL - A switch which automatically adjusts fan speed and compressor discharge pressure.

E EQUALIZER SOLENOID - Opens or closes the pressure equalizing circuit from the discharge side of the compressor to the suction side.

THERMAL EXPANSION VALVE - Meter liquid refrigerant into evaporator coil distributor

R - A reservoir for liquid refrigerant which tends to stabilize operation of the refrigeration system.

TER - A device that provides a low-resistance path to ground for stray currents, such as ignition and high frequency wiring.

VALVES - Valves for suction and discharge when air conditioning refrigerant is being tested and serviced.

GLASS - A diagnostic tool to observe refrigerant flow and refrigerant level.

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 Delay Relay, Time (K3)
 Destruction of Army Materiel to Prevent Enemy Use
 Diagnosing Compressor Motor Burnout
 Differences Between Models
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 Discharge, System
 Drain Tube Assembly, Lower
 Drip Pan Assembly

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 Eliminator, Mist
 Equipment Data
 Evacuating the System
 Evaporator Coil
 Evaporator Coil Replacement
 Evaporator Fan
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F

Fans and Motors
 Fan, Condenser Assembly
 Fan, Evaporator
 Fan Motor
 Fan Speed Switch (S8)
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 Filter Assembly, RFI
 Filter-Drier (Dehydrator)
 Fresh Air Damper Control
 Fresh Air Screen
 Fuse Replacement

G

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 General Support Maintenance Instructions
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Operation in Extreme Heat
Operation Under Rainy or Humid Conditions
Operation in Salt Water Area

P

Pan Assembly, Drip
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Panel, Control
Panel, Lower
Power Source
Preparation for Storage
Pressure Control Switch (Fan Speed)
Pressure Equalizer Solenoid Valve
Pressure Regulating Valve
Pressure Relief Valve
Pressure Switches
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Pressure Testing
Purpose

R

Receiver
Receipt, Hand
Receptacles
Rectifier Assembly (CR1)
RFI Filter Assembly
Refrigerant Components
Refrigerant Tubing
Regulating Valve, Pressure
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Relay, Compressor Motor (K1)
Relay, Heater (K2)
Relay, Time Delay (K3)
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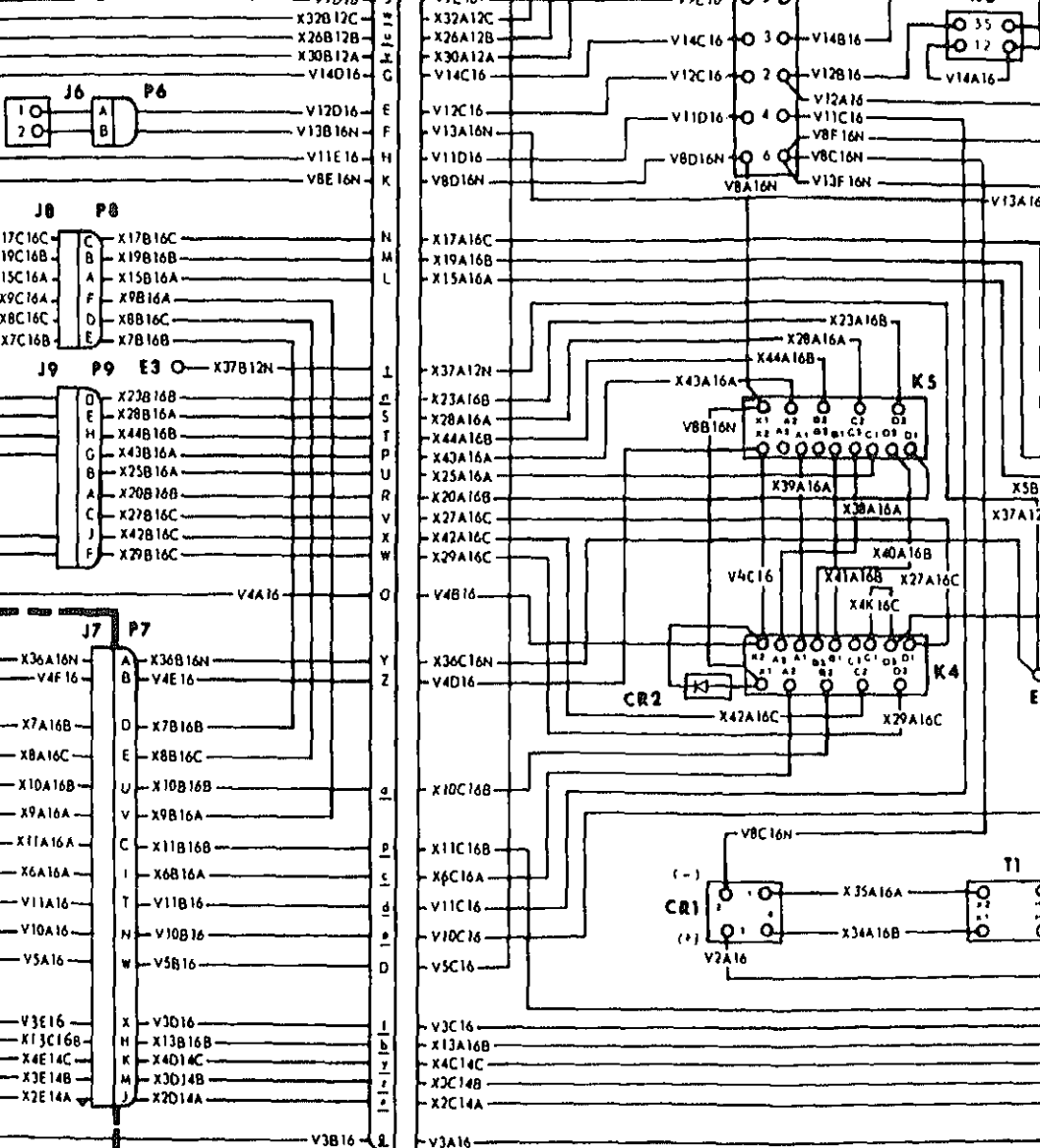
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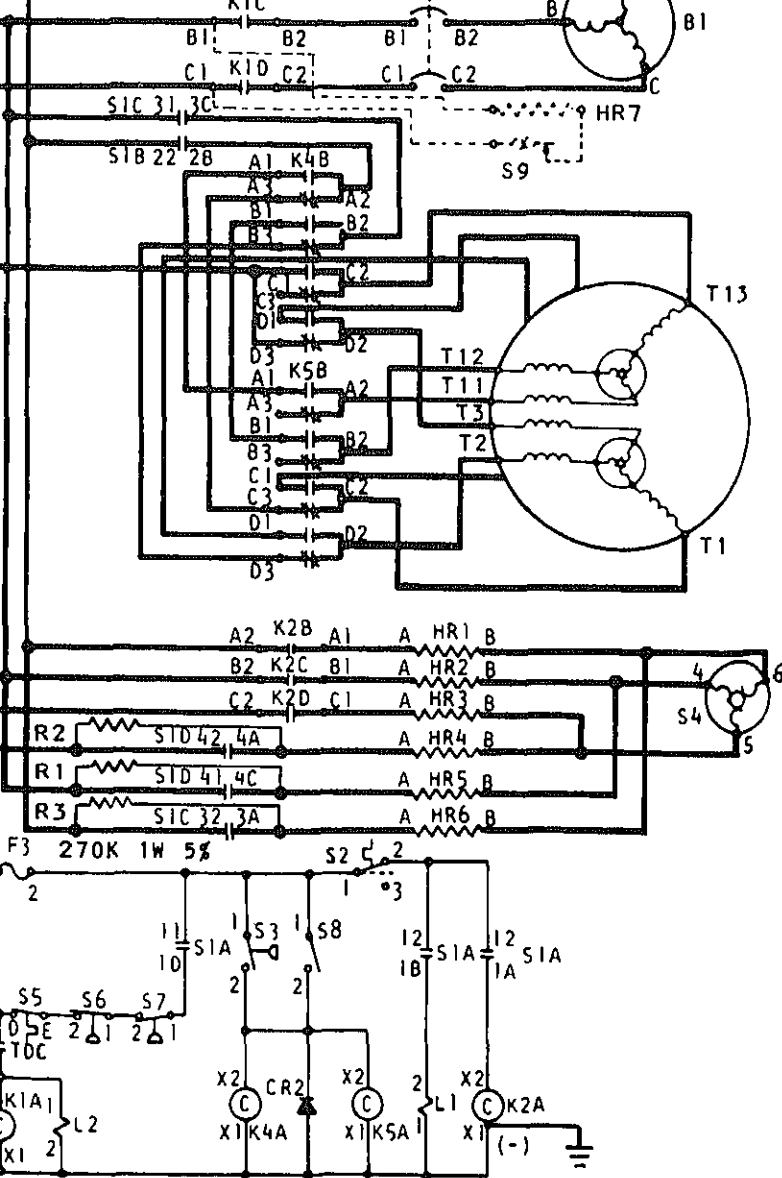
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Pressure Equalizer Solenoid
Pressure Regulating
Pressure Relief
Service
Solenoid
Thermal Expansion
Ventilate

W

Wire Leads and Wiring Harness





SELECT
SWITCH
-SI-
POSITION

1

2

3

4

5

E. C. MEYER
General, United States Army
Chief of Staff

RT M. JOYCE
General, United States Army
Adjutant General

distributed in accordance with DA Form 12-25C, (Line C-4, Block 541)
Requirements for Environmental Equipment Air Conditioners: 18,000 BTU,

☆ U.S. GOVERNMENT PRINTING OFFICE : 1989 O - 242-451 (05)



DOPE ABOUT IT ON THIS
FORM. CAREFULLY TEAR IT
OUT. FOLD IT AND DROP IT
IN THE MAIL!

JOHN DOE
COA, 3d SNG BSB BN
FT. LEANORWARD, MA
DATE SENT

ICATION NUMBER
-4120-344-14

PUBLICATION DATE
18 May 82

PUBLICATION TITLE
Air Conditioner, Vertical

ACT PIN-POINT WHERE IT IS

IN THIS SPACE TELL WHAT IS WRONG
AND WHAT SHOULD BE DONE ABOUT IT:

PARA-
GRAPH

FIGURE
NO

TABLE
NO

2-1
a

In line 6 of paragraph 2-1a
manual states the engine
6 Cylinders. The engine on
set only has 4 Cylinders.
Change the manual to show
Cylinders.

4-3

Callout 16 on figure 4-3 is
pointing at a bolt. In the
to figure 4-3, item 16 is
a shim - Please correct
one or the other.

line 20

I ordered a gasket, item
19 on figure B-16 by NSN
2 910-00-762-3001. I got
gasket but it doesn't
Supply says I got what
I ordered, so the NSN is
wrong. Please give me a
good NSN

AME. GRADE OR TITLE AND TELEPHONE NUMBER

SIGN HERE

DOE, PFC (268) 317, 7/11

JOHN DOE

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UNIT'S ADDRESS

FOLD BACK

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OFFICIAL BUSINESS
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ON NUMBER

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Air Conditoner, Vertical

PIN-POINT WHERE IT IS

PARA-
GRAPH

FIGURE
NO

TABLE
NO

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NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

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Air Conditioner, Vertical

CT. PIN-POINT WHERE IT IS

PARA-
GRAPH

FIGURE
NO


TABLE
NO

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AND WHAT SHOULD BE DONE ABOUT IT:

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PUBLICATION TITLE

Air Conditoner, Vertical

EXACT. PIN-POINT WHERE IT IS

PARA- GRAPH	FIGURE NO	TABLE NO
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IN THIS SPACE TELL WHAT IS WRONG
AND WHAT SHOULD BE DONE ABOUT IT:

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UNIT'S ADDRESS

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